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A. B. CONNER, DIRECTOR
COLLEGE STATION, BRAZOS COUNTY, TEXAS

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DIVISION OF FARM AND RANCH ECONOMICS

IN

COOPERATION WITH BUREAU OF AGRICULTURAL ECONOMICS,
UNITED STATES DEPARTMENT OF AGRICULTURE

AN ECONOMIC STUDY OF FARM ORGANIZATION IN THE PINEY WOODS FARMING AREA OF TEXAS

AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS
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**In cooperation with U. S. Department of Agriculture.
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The Piney Woods farming area of Texas comprises twenty-three counties in the northeastern part of the state. The majority of the farms are operated by family labor. Topographic conditions do not permit the general use of large machinery; consequently these farms are small, the land in crops ranging from 35 to 45 acres. The prevailing system of farming is centered on cotton production. Approximately two-thirds of the crop acreage is usually planted to cotton, with about 80 per cent of the total cash receipts derived from the sale of cotton lint and seed.

The physical characteristics of the area are not favorable to the adoption of the low-cost methods of producing cotton which are being effected in competing areas through the use of large-scale machinery. Consequently readjustments have been and are likely to continue to be largely in the direction of including other and, in most cases, more intensive enterprises to supplement the income from the cotton. The prinicipal enterprises involved in these farm readjustments are tomatoes, sweet potatoes, watermelons, peas, numerous other crops of lesser importance, and dairying.

The purpose of this study is to provide basic information which may serve as a guide to farm operators in making the adjustments in their farm organizations which give promise of returning maximum profits. The various enterprises are evaluated in terms of their production requirements in relation to crop yields and livestock production. The usual requirements for the production of an acre of cotton yielding 324 pounds of seed cotton, for example, were 76 hours of man labor, 40 hours of horse work, one bushel of seed, and 200 pounds of fertilizer. The relative proportions of various enterprises that may best be combined to utilize farm resources, from the viewpoint of producton requirements and returns, are stressed. The use of this information is then illustrated, step by step, by means of farm budgets.

Using data based on groups of farms and price relationships that prevailed in the area during the nine-year period 1921-29, the analysis reveals the weakness of the system in which receipts from cotton sales constitute the greater part of the cash income. Different combinations of cotton with tomatoes, sweet potatoes, watermelons and peas, and dairying gave net farm incomes of $297, $185, $187, and $293, respectively, more than the straight cotton system. Relatively favorable returns from the diversified systems were indicated when 1931 prices were used in the budgets. These modified cotton systems not only returned higher incomes because of better utilization of resources, but lessened the risk of extreme variations in farm income due to variations in yields and prices of cotton. The selection of the combination that may be the most profitable should be governed by market considerations and the adaptability of the various enterprises to individual farm resources.

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AN ECONOMIC STUDY OF FARM ORGANIZATION IN THE PINEY WOODS FARMING AREA OF TEXAS

C. A. BONNEN, B. H. THIBODEAUX,* J. F. CRISWELL**

The Piney Woods farming area of Texas comprises approximately twenty-three counties in the northeastern part of the state (Figure 1). Cotton, the principal crop grown, occupies somewhat more than 60 per cent of the crop land and with corn, the main feed crop, is the basis for the prevailing type of farming. On the great majority of farms, cotton is the only commercial enterprise of importance; other enterprises are included primarily to supply farm and family requirements for feed and food. The commercial production of tomatoes, sweet potatoes, watermelons, numerous other crops of lesser importance, and dairy products in certain parts of the area constitute the principal variations from this usual type of farming.

Certain factors have encouraged farmers to depend on cotton for all or a large part of their cash income. Considering the area as a whole, cotton has a greater comparative advantage than other crops grown. Custom and training in production and the ready marketability of the crop also account for the prominence accorded the cotton enterprise in the farming systems. Such a high degree of specialization, however, has certain pronounced disadvantages. One of these is the wide variation in farm returns caused by fluctuations in yields and prices. Another disadvantage of the system is the poor utilization made of the farm labor. Usually, enough labor is kept, either in the form of members of the family or croppers and tenants, to meet the peak of labor requirements during the chopping and picking of cotton. This labor is then idle for considerable periods during the year unless temporary outside employment is available.

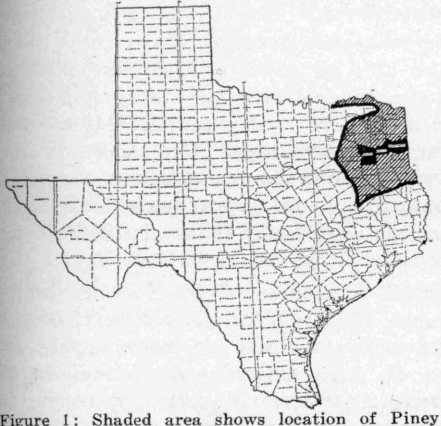

Figure 1: Shaded area shows location of Piney Woods farming area of Texas. Black portion shows locality in which detailed study was made.

While this should not seem to be disadvantageous on farms operated on the share-cropper plan, it should be remembered that, in most cases, this class of labor has to be "advanced" all or a large portion of their living requirements during the crop season. In years of low prices or low yields, proceeds from the croppers' or tenants' share of the crop often are insufficient to cover these "advances." The larger the number of croppers or tenants, therefore, the greater is the risk to the landlord, who usually assumes the re-

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sponsibility of being creditor or is held responsible by a merchant for his croppers' accounts.

The family farms typical of the area are small in size. The acreage of land in cotton that can be handled per family is largely limited by the amount that can be chopped and picked by the labor available. With some family or hired labor available during rush periods, a farm operator will usually handle 35 to 45 acres in crops. Approximately two-thirds of this crop acreage will be in cotton and the balance in food and feed crops. On the larger farms, the crop land in excess of that operated by family labor is usually worked by croppers or tenants. The rolling-to-hilly topography and the small, irregular-shaped fields caused by the wooded nature of many sections of the area do not permit the general use of large-scale machinery.

The relatively heavy rainfall, because of its stimulating effect on weed growth and the resultant necessity for increased hoe work, is also a factor causing a small acreage per man.

On the many farms in the area that are characterized by a limited crop acreage per family and the reliance on cotton for a large portion or all of the cash farm income, it is inevitable that some readjustment will have to be effected if relative farm incomes comparable to those of the past are to be maintained. With economics being effected in cotton-production methods in areas where large-scale machinery is adapted, farmers in the hill sections of Northeast Texas are facing increasingly severe competition in cotton production. In view of changing economic conditions involving a strong possibility of an unfavorable relationship of cotton prices compared to prices of commodities and services that farmers buy, farm operators in the area are facing the probability of having to accept lowered standards of living unless they are able to adjust their businesses to offset these changed conditions.

The operator endeavoring to increase his farm earnings may follow one of two courses, or he may be able to effect a combination of the two. He may make his operations more extensive by enlarging his crop acreage through the use of larger machinery, where practicable, and thus increase the earning power of the labor available. Or, conditions may favor the other course of readjusting the farm organization to include additional and more intensive enterprises on approximately the same acreage formerly operated. The course eventually followed will be determined largely by the operator's environment and resources.

As brought out previously, a large proportion of the farmers in this area are limited in the general use of large farm machinery because of topographical conditions. Present possibilities do not indicate any appreciable shift in the direction of more extensive operations in the form of increasing the crop acreage, particularly cotton, per man or per family. On farms larger than the typical family farm, a larger crop acreage usually means the addition of more families of croppers or tenants, or duplication, in part at least, of the family farm by the addition of more family units. A considerable improvement could be

effected, however, in the adoption of at least one-row machinery in lieu of the more common half-row implements now in use. This would result in the releasing of a considerable amount of labor and making it available for the production of other enterprises which offer promise of profitableness if included in the organization.

The alternative is left, then, of endeavoring to increase farm earnings by readjusting or changing the pattern of the present farm organization by the inclusion of other and possibly more intensive enterprises to supplement the income derived from cotton. This readjustment would have to be made on the basis of a better utilization of the resources available, and in most cases, without displacing cotton as the main enterprise.

This study was undertaken with the object of providing the basic information that will enable farm operators to evaluate the leading farm enterprises of the area in terms of their adaptability to various farming systems and to measure the effect of these various enterprises on farm earnings when included in the farm organization in varying proportions.

Sources of Information

The basic data for this study were obtained by means of detailed farm accounts kept on a number of farms in Smith, Gregg, and Harrison Counties. Enterprise data to supplement these detailed accounts were obtained by means of the survey method. Other data were obtained from the soil survey reports available for the area, from reports of the United States Weather Bureau, from Census publications, from published reports of the bureau of Agricultural Economics regarding market movements and prices, and from reports or unpublished information available at the Texas Agricultural Experiment Station. Price data of a local nature were obtained from dealers and newspapers in the area. County agricultural agents, vocational agricultural teachers, and others in the area assisted materially in supplying information pertaining to various phases of the work.

Detailed farm accounts were completed on 18 farms in 1928 and on 9 farms in 1929. Records were kept on the investment in the business, cash receipts and expenses, yields, production and production requirements of crops and livestock, and products furnished the household by the farm. The keeping of these accounts was closely supervised by a field agent who visited the farms at approximately two-week intervals.

During the spring of 1930, enterprise survey records were obtained to supplement the data from the detailed farm accounts. Records were obtained on the dairy, tomato, sweet potato, pea, and watermelon enterprises. Information was obtained on the man labor, horse work, material requirements, and cash costs used in production; further data were obtained on livestock production and crop yields, and organizational data were obtained to indicate the usual relative importance of the various enter-

prises when included in the farm organization. In addition to the enterprise surveys, questionnaires pertaining to crop yields and livestock production were mailed to county agents, vocational agriculture teachers, and farmers in the area.

DESCRIPTION OF AREA

Soils and Topography

The topography of the area studied is usually described as rolling to hilly. Drainage is entirely by means of numerous small rivers and streams. The soils may be divided roughly, on the basis of topography, into upland soils and bottomland or alluvial soils. The upland soils are largely sands and sandy loams. With the exception of the Nacogdoches series, all have gray to light-brown surface soils and resemble each other to a marked degree. The distinguishing differences are largely in the color and texture of the subsoils and in the related conditions of drainage.

The upland soils may be divided further on the basis of drainage. Some have porous, sandy clay subsoils, and are well drained. They are considered "early soils." Others have heavy clay subsoils and, except on the slopes, are poorly drained. They are known as the "late soils"; that is, planting is delayed in the spring, owing to slow drainage and the slow warming-up of the soil. In general, the soils in the western half of the area include a much larger proportion of the well-drained soils than do those in the eastern half. Variations in croping systems within the area are closely related to variations in soil types. A greater variety of crops is grown on the soils having porous subsoil than on the less well-drained soils. The commercial production of fruits and vegetables is largely concentrated on the former class of soils.

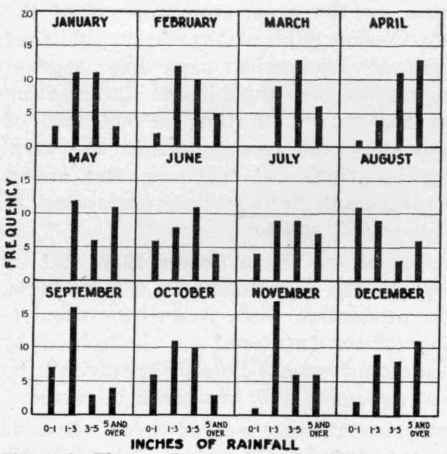

Figure 2: The number of times specified amounts of rain have fallen at Longview, Gregg County, during each month for the thirty-year period, 1900-1929.

The alluvial soils usually occur in narow strips along the streams and, in addition to be in small in extent, are, for the most part, poorly drained. However, such of these soils as are well-drained are very productive as compared to the upland types.

Rainfall

The average annual rainfall varies from slightly less than 40 inches in

the western part of the area to somewhat more than 45 inches in the eastern part. March, April, and May are the months of heaviest rainfall, while August, September, and October represent the drier season of the year.

The chances of receiving a heavy or light rainfall during any one month are shown in Figure 2. This figure is based on data taken from the records of the weather station at Longview, in Gregg County. It will be noted that March and May show more than one inch of rainfall every year, while April and November have received less than one inch of rain but once in 30 years. The chances are almost five to one that more than 3 inches of rain will fall during April, the month normally receiving the greatest rainfall, while during September, the month having the lowest average rainfall, the chances are better than three to one that less than 3 inches of rain will fall.

Temperature

The area has a growing season of approximately 8 months. Variations in the length of the growing season at Longview are indicated in Figure 3. The average growing season at Longview for a thirty-year period (1900 to 1929) was 254 days. The shortest growing season of 225 days occurred in 1920, while the longest growing season recorded was one of 282 days, in 1905. The average date of the last killing frost in the spring was March 10, while the average date of the first killing frost in the fall was November 19.

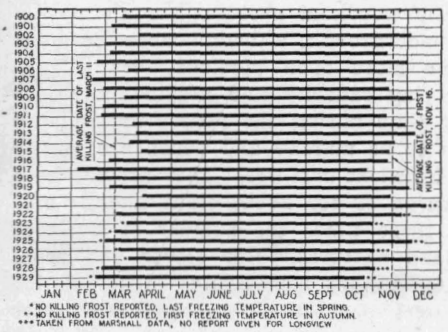

Figure 3: The frost-free period, the yearly dates of the last killing frost in spring and the first killing frost in autumn, and the average frost dates for the thirty-year period, 1900-1929, at Longview, Gregg County.

It will be noted from Figure 3 that frost occurred only twice after April 1 and that the latest frost recorded in 30 years previous to November 1 and the earliest frost recorded was on October 20. It may logically be assumed from these figures that there is but little danger of frost after April 1 and previous to the first of November at Longview.

Natural Vegetation

The entire area lies within the East Texas Timber Belt. The greater portion of the timber growth on the uplands consists of short-leaf pine, sweet gum, and various kinds of oaks. The various types are unevenly distributed. As one goes from the eastern and southern portions of the

area to the North and West, the pine decreases and oaks and other types increase until in the western parts of Morris, Wood, Smith, and Anderson Counties the pine practically ceases and the oaks predominate. Hardwoods prevail in lowlands along the streams; the principal types being pin oak, water oak, elm, ash, ironwood, and gum.

Approximately 60 per cent of the land of the area is in farms and but 50 per cent of the farm area is cropped. A large portion of the land not in farms is supporting some kind of tree growth and some fairly large bodies of merchantable timber are found in certain parts of the area. There are also small amounts of woodland on the majority of farms. The chief commercial outlet for farm timber is in the form of cross ties, poles, and firewood.

The principal forest grass is broom sedge. On the older cleared lands, Bermuda is rapidly becoming the most important grass. In the moist bottoms Bermuda, carpet grass, and Lespedeza are the types most usually found. Other grasses and pastured legumes of minor importance are Dallis grass, bur clover, and vetch.

Pastures occupy at least a third of the farm land of the area. The greater part of this pasture land is upland and varies greatly in vegetation and in carrying capacity. The better upland pastures contain Bermuda grass with some Lespedeza and white clover. They are at their best during May and June, and usually for a short time during the late fall months. During the remainder of the year they have a very low carrying capacity per acre. The woodland pastures contain mostly sedge grass and typical woodland undergrowth, although some Bermuda and carpet grass are found in the more open portions. As a rule, woodland pastures have a low carrying capacity and provide nutritious grazing for only a short period of time during the year. Bottomlands which are not so poorly drained as to be marshy and which are mostly clear of trees and underbrush make excellent pastures. They provide good grazing throughout the growing season or for about eight months and, on the average, will carry two to three times the number of livestock per acre as will the ordinary upland pastures. Bur clover and white clover grow luxuriantly on the better-drained bottomlands. The relation between pasture resources and livestock production is considered in the discussion of dairying in the area.

Present General Type of Farming in the Area and Variations from that Type

According to the report of the 1930 Census of Agriculture, slightly more than 60 per cent of the crop acreage was in cotton and approximately 20 per cent in corn. The remainder of the cropping system was made up of a wide range of crops (largely feed crops and vegetables), none of which occupied more than a small percentage of the total crop area.

As in other areas in which cotton occupies the major portion of the crop land, livestock are of minor commercial importance. In addition

to the necessary workstock, the majority of farmers keep very few more cattle, hogs, and poultry than are required to provide dairy products, meat, and eggs for home use. The livestock combination on most farms is usually one or two cows, a "meat hog", and 50 to 75 chickens.

The average crop and livestock organization in each county of the area, as indicated by the 1930 Census, is shown graphically in Figure 4. The high degree of uniformity in the proportions of the different crops and kinds of livestock from county to county throughout the area indicates a strong tendency on the part of farmers in the area to follow the same general type of farming.

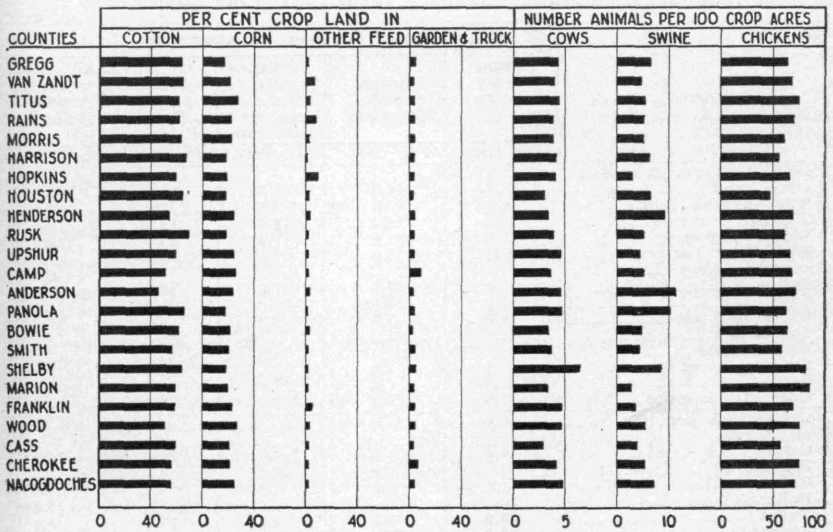

Figure 4: The percentage of the total crop land in various crops and the numbers of different classes of livestock per 100 acres in crops. (Data from 1930 Census report for Texas.)

In particular localities and on specific farms, however, considerable variation from the general type of farming is to be found. Some of the more common of these variations are given in Table 1, in which four different systems characterized by certain special enterprises are shown in comparison with the more usual or cotton type of farming. These variations represent the efforts of a certain proportion of the farmers of the area to adjust their farm organizations to meet the changing economic conditions discussed in the introduction of this Bulletin.

The localization of the production of these special enterprises is due largely to limited market outlets and to the advantage of certain soil types over others in production. Local markets are small and are soon oversupplied, while keen competition is encountered in the central markets with products from other areas. Because of these conditions, the commercial production of these special enterprises tends to be concentrated

in parts of the area where conditions are especially favorable. This will, for the most part, explain the concentration of commercial truck-crop production in the western half of the area where, as was pointed out in the discussion of soils, the well-drained and earlier soils predominate. It will also explain, in part at least, the concentration of the production of certain truck crops in different sections of that portion of the area—for example, tomato production in Smith and Cherokee Counties, pea and watermelon production in Henderson and adjoining counties, and the centering of sweet-potato production in Camp County. An additional factor influencing the localization of sweet-potato production is the restrictions placed on marketings from weevil-infested areas.

Table 1. Typical Systems of Farming in the Piney Woods Farming Area

Items	Usual Type, Cotton	More Common Variation from Usual Type			
		Cotton with Tomatoes	Cotton with Watermelons and Peas	Cotton with Sweet Potatoes	Cotton with Dairying
	Per Cent	Per Cent	Per Cent	Per Cent	Per Cent
Proportion Farm Area In:					
Crop land	57.0	46.0	46.0	54.0	46.0
Tillable idle land	4	7.0	7.0	7.0	7.0
Tillable pasture	10.0	13.0	13.0	13.0	17.0
Woods pastured	21.0	27.0	27.0	23.0	23.0
Woods not pastured	8.0	7.0	7.0	3.0	7.0
Proportion Crop Land In:					
Cotton	76.0	57.0	47.0	56.0	57.0
Corn	17.0	29.0	23.0	25.0	29.0
Other feed crops	6.0	7.0	7.0	10.0	11.0
Tomatoes	----	3.0	----	----	----
Watermelons	----	----	6.0	----	----
Sweet potatoes	----	1.0	----	6.0	----
Peas	----	----	14.0	----	----
Other truck crops	1.0	3.0	3.0	3.0	3.0
No. Livestock per 100 Crop Acres:					
Cows	2.3	4.3	4.3	6.3	14.2
Heifers	0	1.4	1.4	2.5	2.8
Calves	1.2	2.8	2.8	3.8	8.6
Bulls	----	----	----	----	1.4
Swine	7.0	8.5	8.5	15.0	4.3
Poultry	70.0	71.4	71.4	93.7	85.7
Work stock	5.8	7.1	5.7	6.3	5.7

The production of dairy products is rather widely distributed over the area. There is, however, apparently greater production of dairy products in the eastern and northern sections as compared to the western part of the area. Soil types and other natural factors which are somewhat more favorable to pasture production and less favorable to crop diversification in the eastern and northern parts of the area may be the explanation of the difference.

Variations in Farm Income

Additional information pertaining to the general nature of farming in the area may be obtained from a study of Tables 2 and 3 in which a summary of the organization, production, and earnings on nine farms during 1929 is shown. Wide variations will be noted in farm income as well as in the proportionate income from crops as compared to that

from livestock. Such variations in incomes may be due to differences from farm to farm in natural resources or they may be the result of differences in efficiency of management, or both. Only the latter causes are within the control of the operator and it is on these that attention should be centered in an effort to increase farm incomes.

Table 2. Financial and Physical Organization of Nine Farms in Smith, Gregg, and Harrison Counties, 1929.

	1	3	5	6	9	12	13	14	18
CAPITAL INVESTMENT:									
Land	4,100	7,929	2,450	5,375	5,410	3,500	15,660	3,200	7,275
Buildings and Water System*	463	1,025	281	1,376	1,970	830	2,450	1,485	2,080
Machinery and Equipment	733	348	389	752	1,563	645	1,160	592	820
Work Stock	250	100	200	355	850	315	815	500	620
Other Livestock	655	1,046	524	472	1,876	1,327	572	285	2,205
Feeds and Supplies	108	1,400	1,370	243	745	427	168	1,463	740
Total Investment	6,309	11,848	5,214	8,573	12,414	7,044	20,825	7,525	13,740
ORGANIZATION OF FARMS:									
Total Acres	164	176	70	215	270	100	522	80	145
Pasture, Woodland, etc.	68	85	31	65	84	43	155	29	32
Total Crop Land	96	91	39	150	186	57	367	51	113
Idle Land				35			222		
Land Rented Out (3rd and 4th)	75	35		80			100		73
Crops Grown:									
Cotton	4	38	15	23	150	20	32	35	20
Corn	5	17	20	5	30	7	9	6	7
Tomatoes			2						2
Watermelons				2	1				
Peas					5	14		10	
Cowpeas	5					6			7
Oats	6					5			
Sorghum	1					5	4		2
Truck		1	2	5					2
Total Man Hrs. on Crops	635	1,700	2,655	4,497	6,845	2,241	1,644	2,520	4,085
Total Horse Hrs. on Crops	733	1,510	1,707	1,575	4,609	1,815	1,604	2,351	2,619
Number of Livestock Kept:									
Workstock	2	2	2	3	6	3	7	4	4
Milk Cows	9	7	4	2	10	9	5	2	7
Other Cattle	5	4	2	3	3	3	2	2	4
Hogs	1		8	4	5	1	8	2	8
Chickens	55	220	65	75	50	75	55	60	35
Total Man Hrs. on Livestock	869	1,191	690	570	1,131	806	773	1,073	1,218
Total Horse Hrs. on Livestock	30	76	10	8	72	108	12	6	80

*Does not include dwelling.

THE MAIN CONSIDERATIONS IN PLANNING THE FARM ORGANIZATION FOR INCREASED PROFITS

The Adaptability of Enterprises

The discussion of the general characteristics of the area and of the forces that may cause readjustments in farming, as taken up in the foregoing sections, may serve to indicate the elements in the problem of effecting profitable farm readjustments in the area. The direction and kind of changes now being made or in prospect have been pointed out. The manner in which differences in the physical attributes of the area have caused a certain localization in the production of various commercial enterprises has been discussed. It is recognized, however, that certain forces other than physical may affect the profitableness of various farm enterprises in particular localities. Further information pertaining to individual enterprises is needed, therefore, before dealing with the various farming systems into which these enterprises may be

combined. Information is needed in evaluating the general considerations and specific factors that would tend to limit or further the expansion of individual enterprises adapted to the area. Market demands, relative profitableness, and farm requirements for food and feed may be mentioned as some of these factors. In view of the labor available, it is also necessary to know the manner in which different enterprises combine with each other, with respect to the distribution of labor requirements, in determining the workability of different combinations. A combination of several enterprises having heavy labor requirements at the same time may not be feasible because of the scarcity of labor. On the other hand, a combination may be effected which would utilize the labor force profitably throughout the work season and eliminate, in part at least, the heavy peak loads of labor requirements which would necessitate the hiring of additional labor. In the following discussion the leading farm enterprises are considered individually to indicate the proper perspective that will enable one to determine the most efficient combination of enterprises adapted to the area.

Table 3. Crop Production and Farm Income on Nine Farms in Smith, Gregg, and Harrison Counties, 1929.

	1	3	5	6	9	12	13	14	18
Physical Production:*									
Cotton (lbs. lint)	388	5,062	4,220	3,572	15,645	3,170	8,930	7,950	4,291
Corn (bushels)	60	150	250	67	200	150	125	200	200
Tomatoes (lbs.)			7,847						24,300
Watermelons (tons)				15	10				
Peas (bushels)					25	40		30	
Cowpeas (tons)	2					3			7
Oats (tons)	3					2			
Sorghum (tons)	1					4	6		3
Income per Farm:									
Cash Receipts:									
Crop Sales:									
Cotton	$ 99	$ 804	$1,167	$ 582	$2,576	$ 526	$1,563	$2,112	$ 693
Cotton seed	13	65	69	140	236	135	158	267	81
Vegeables	32	148	611	1,149		100			1,072
Other Crops	4								
Total Crop Sales	148	1,017	1,847	1,871	2,812	761	1,721	2,379	1,846
Livestock & Livestock Products									
Horses and Mules			25					90	25
Cattle	180	245	33	98	19	224	130	8	320
Hogs	2		136	52			20	85	174
Poultry		165	13	52				8	
Dairy Products	203	114			873	605	261	171	177
Eggs	22	606	24	53		44	76	70	29
Total Livestock Sales	407	1,130	231	255	892	873	487	432	725
Miscellaneous Receipts	101	18	144	213	20		238		300
Total Cash Receipts	656	2,165	2,222	2,339	3,724	1,634	2,446	2,811	2,871
Cash Expenses:									
Crops	45	196	191	269	429	47	305	264	330
Livestock	10	25	98	7	69	165	527	43	35
Feeds	118	544	7	201	633	290	175	282	461
Labor (Hired)	60	139	11	24	1,734		225	352	327
Equipment	30	97	90	703		23	661	1,009	1,495
Real Estate		34	130	48			130	41	114
Car Expense	68	47	83	85	127	51	171	142	177
Tax (R. E. and Pers. Property)	42	46	46	61	60	27	119	226	69
Total Cash Expenses	373	1,128	656	1,398	3,052	603	2,313	2,359	3,008
Net Cash Income	283	1,037	1,566	941	672	1,031	133	452	—137
Change in Inventory	—338	30	—621	—226	—1,317	—359	200	—269	317
Farm Income	— 55	1,067	945	715	— 645	672	333	183	180
Products Used in Home	428	800	609	857	994	790	1,299	666	935
Family Farm Income	373	1,867	1,554	1,572	349	1,462	1,632	849	1,115

*Does not include products or income from rented land.

Certain enterprises such as poultry, swine, and some of the minor feed crops are not considered in any great detail because of the relatively small place they occupy in the farm organizations of the area. Sufficient information pertaining to labor distribution is presented, however, to indicate how these enterprises may be coordinated with other enterprises when included in the organization.

Although not treated as a farm enterprise in this publication, farm woodlands are a valuable asset to the farmers of the area. They not only are the main source of fuel and posts for farm use, but are drawn upon frequently to supplement the cash income through the sale of crossties and posts, especially during winters following low incomes from the cotton crop.

Cotton

In terms of the proportion of the total crop area devoted to its production and of the gross farm income derived from its sale, cotton is the most important crop grown in the 23 counties comprising the Piney Woods farming area of Texas. As previously stated, 60 per cent of the total crop land in the area is in cotton. The proportion of the crop land in cotton for each county is shown in Figure 4. The proportion of crop land in cotton for the different counties is uniformly high, ranging from 47 to 67 per cent.

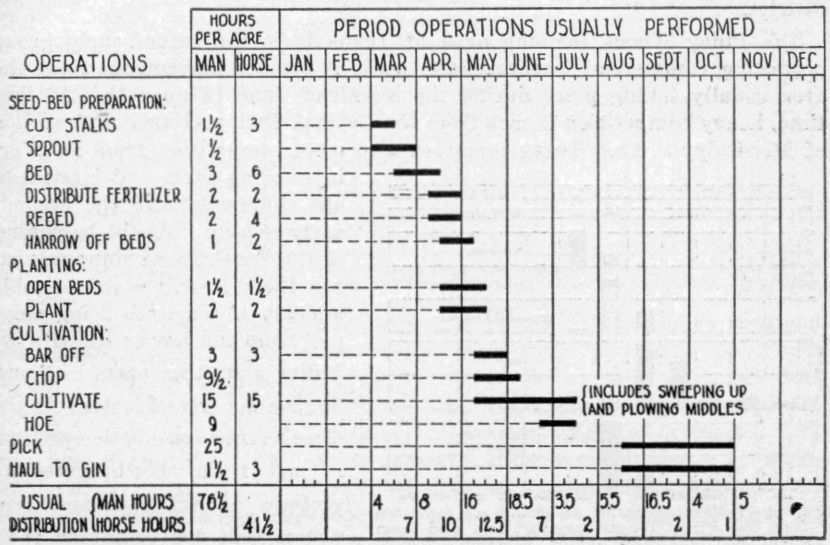

Figure 5: Man-labor and horse-work requirements for cotton production per acre by operations, usual distribution by months, and periods of time during which operations are usually performed.

There is a wide variation in the size of cotton farms in the area. The larger farms, as previously indicated, are usually worked by croppers or tenants for a share of the crop, with the operator acting as super-

visor, or manager. The so-called family farm, however, with all or a large part of the labor furnished by members of the family, is the most common type.

The labor requirements of cotton are particularly heavy during the chopping and picking seasons, and serve as the limiting factor determining the acreage that can be handled by a specified labor force. The present obstacles in the way of successful substitution of machine for hand methods in removing these labor peaks have already been pointed out. The usual operations in producing cotton, with the monthly distribution of the man labor and horse work required, are shown in Figure 5. This labor distribution is summarized in Figure 15 in order to show the manner in which cotton and various other enterprises may compete for labor when included in the farm organization.

Tomatoes

The first commercial shipment of tomatoes from East Texas was made in 1897, when six cars were shipped from the area. Production has increased until the present time, the average yearly number of carload shipments now being well above twenty-five hundred. The principal tomato-producing counties in the area are Cherokee and Smith Counties, with lighter shipments from Anderson, Henderson, and other neighboring counties. Jasksonville, in Cherokee County, is considered the center of the district.

The Piney Woods farming area of Texas is in the second-early group producing commercial tomatoes, the peak of tomato movements from the area usually taking place during the month of June (Figure 6). At that time, heavy competition is met from the Crystal Springs-Hazelhurst section of Mississippi. East Texas tomatoes also meet competition from an overlapping of early and intermediate shipments into the second-early season. At the beginning of the Eeast Texas shipping season there is still a considerable amount of tomatoes being shipped from the Lower Rio Grande Valley and other parts of South Texas, and from Florida. At the close of the season, competition is met from the intermediate sections of Arkansas and Tennessee that are beginning their shipping season.

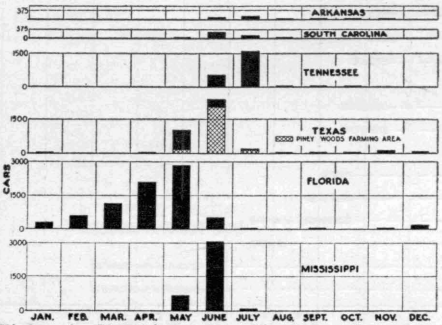

Figure 6: Monthly carlot shipments of tomatoes from the Piney Woods farming area and from Texas and competing states, average 1924-1929. (Data from Bureau of Agricultural Economics, U. S. Department of Agriculture.)

During the five-year period, 1925-29, 25 to 35 per cent of the total carload shipments of tomatoes during June have originated in the Piney Woods farming area of Texas. In formulating production plans, the producer in this area should consider the proposed plantings and prospects

in the heavy-producing competing areas, since the price received for his tomatoes will be greatly influenced by the total quantity and quality of tomatoes available for market at that time. In the past, the tendency has been for producers to act more on the basis of prices paid during the past season than on the basis of prices likely to be paid during the coming season. This, in a large measure, with climatic conditions of course, serves to explain the rather wide fluctuations in production and the resulting fluctuations in price.

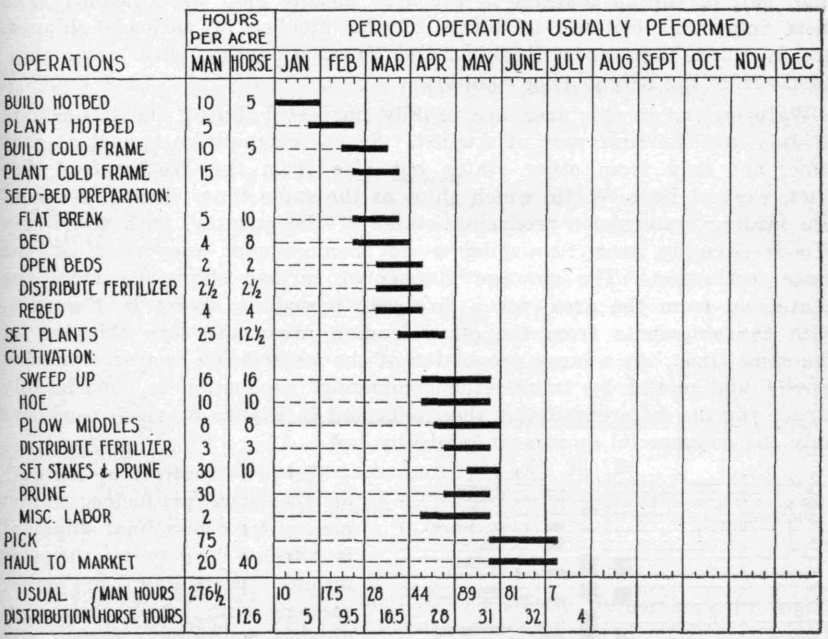

Figure 7: Man-labor and horse-work requirements for tomato production per acre by operations, usual distribution by months, and periods of time during which operations are usually performed.

The farms growing commercial tomatoes on which data were obtained had an average of three acres in the crop, with the bulk, or modal group, having two acres. The 1930 Census shows that 27.5 per cent of the farms in the most important tomato-producing counties reported the production of tomatoes for sale; the acreage reported averaged 1.87 acres per farm. The size of the tomato enterprise in terms of acres per farm is limited principally by the large amount of man labor and horse work required per acre during limited periods of time (Figure 7). As family labor is used to a large extent on most of the farms in the area, the supply of this kind of labor will determine to a large extent the acreage that will be planted to the tomato enterprise. In planning his farming program, the farm-operator should give particular attention to the seasonal labor requirements of tomatoes with regard to possible competition for labor with other crops included in the program (Figure 15).

The heavy peak of labor on tomatoes occurs usually in May and June. In the usual system shown in Table 1, in which tomatoes are grown in addition to cotton and feed crops, there is considerable competition for labor, especially during these months.

Watermelons

Watermelons are grown for home consumption on most farms and are shipped commercially from a rather wide section in the area. More than half of the 23 counties in the area usually ship watermelons. The most important centers, in terms of the number of carloads shipped, are in Wood, Henderson, Hopkins, and Morris Counties, with lesser shipments from the neighboring counties.

Watermelons in this area are usually harvested during the latter part of July and the first part of August. Severe competition is met at that time, not only from other states but also from the Weatherford district, west of Fort Worth, which ships at the same time. Texas is one of the leading watermelon-producing states of the country, with the Piney Woods farming area furnishing a not inconsequent proportion of the state production. The average number of carload shipments from the State and from the area, for a five-year period, is shown in Figure 8, with the shipments from the other leading areas that are shipping at the same time. As a large proportion of the watermelon crop is consumed locally and moved by trucks, the commercial production is considerably larger for the different States than indicated in Figure 8, which considers only the commercial movement going by rail.

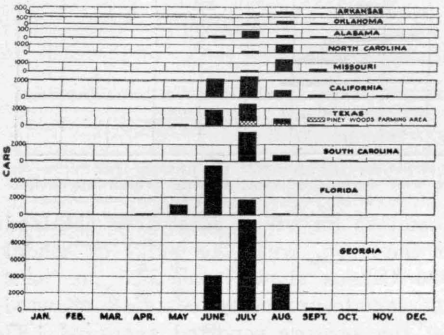

Figure 8: Monthly carlot shipments of watermelons from the Piney Woods farming area and from Texas and competing states. (Data from Bureau of Agricultural Economics, U. S. Department of Agriculture.)

The price received by farmers of the area producing watermelons for commercial shipment is affected largely by the conditions prevailing in other sections with which their production competes. Supply and demand conditions determining prices paid for watermelons are rather delicately balanced, with a resulting wide fluctuation in prices when production is not adjusted to demand. The information contained in Figure 8 indicates the most important producing states in which production is likely to affect prices received by the East Texas producer. Making use of agricultural outlook information will enable the individual grower to plan his production program according to anticipated prices, depending on conditions affecting the supply of and demand for the commodity.

Watermelons and peas produced for market are grown in the same

general section and are commonly found on the same farms. Where both crops are grown, the two will generally be found in the proportion of 4 acres in watermelons and 10 acres in peas (Table 1). The inclusion of watermelons and peas in the crop-land organization of farms formerly growing only cotton as a cash crop seems to be mainly at the expense of the cotton acreage.

The usual operations in producing watermelons, with the monthly distribution of man labor and horse work, are shown in Figure 9. The manner in which the watermelon enterprise competes for labor with other commercial crop enterprises may be noted from Figure 15.

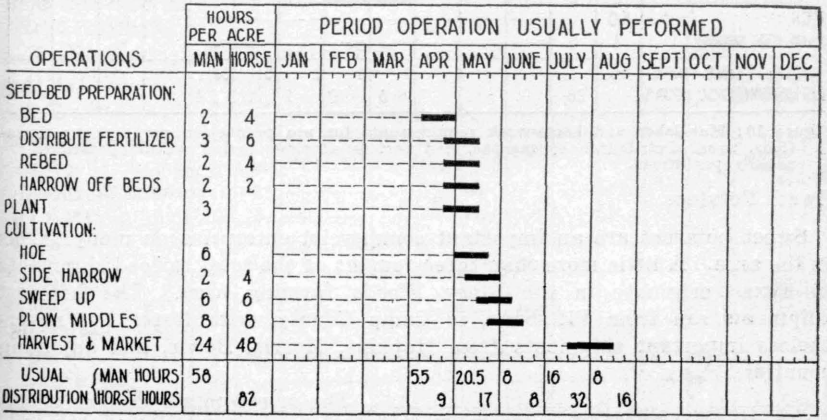

Figure 9: Man-labor and horse-work requirements for watermelon production per acre by operations, usual distribution by months, and periods of time during which operations are usually performed.

Peas

Edible dried peas are of considerable commercial importance in some sections of the area. Black-eyed peas are the chief variety grown, with the Lady and Cream varieties occupying a less extensive area. The heaviest shipments are from Henderson County.

Peas are usually custom-threshed and sold to cash buyers at central shipping points. Shipping begins usually during the latter part of July. The relative non-perishability of the product permits local dealers, especially, to ship at their discretion according to market conditions and demand. The bulk of the crop, however, is usually moved out by late fall or early winter.

Peas and watermelons are grown commercially in the same general section, as previously stated, and are commonly found on the same farms. The general considerations affecting the inclusion of peas as a commercial enterprise in the farm organization have been taken up in the discussion of the watermelon enterprise. The usual operations in producing peas, with the monthly distribution of man labor and horse work, are shown in Figure 10. The manner in which peas compete for labor with other enterprises may be noted from Figure 15.

OPERATIONS	HOURS PER ACRE MAN	HORSE	PERIOD OPERATIONS USUALLY PEFORMED JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
SEED-BED PREPARATION:														
BED	2	4												
HARROW OFF BEDS	1	2												
PLANT	2	2												
CULTIVATION:														
SIDE HARROW	2	4												
SWEEP UP	2	4												
PLOW MIDDLES	2	2												
MISCELLANEOUS	2	2												
PICK	50													
HAUL TO MARKET	3	6												
USUAL DISTRIBUTION MAN HOURS	66					5	6	2	15	38				
USUAL DISTRIBUTION HORSE HOURS		26				8	10	2	2	4				

Figure 10: Man-labor and horse-work requirements for pea production per acre by operations, usual distribution by months, and periods of time during which operations are usually performed.

Sweet Potatoes

Sweet potatoes are an important commercial enterprise on many farms in the area. A little more than three-fourths of the total carload shipments in Texas originate in the Piney Woods farming area. The heaviest shipments are from Pittsburg, in Camp County, with lesser but nevertheless important shipments from Hopkins, Morris, Bowie, and adjoining counties.

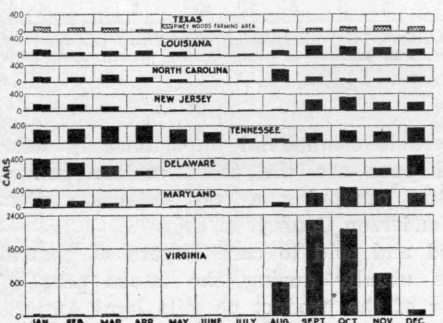

Figure 11: Monthly carlot shipments of sweet potatoes from the Piney Woods farming area and from Texas and competing states. (Data from Bureau of Agricultural Economics, U. S. Department of Agriculture.

The sweet-potato crop is usually harvested sometime during the first three weeks in October. The period of marketing the crop, however, may be extended through the following spring. The practice formerly was to sell practically all of the crop to local dealers and shippers as green potatoes but many producers now have their own drying kilns. This permits them to cure their crop and defer selling until a later period when better prices are likely to prevail.

Figure 11 shows the average monthly carlot shipments of sweet potatoes, over a five-year period, for Texas and the more important states that ship at the same time. While the shipments are distributed throughout the year, the heavy movement from Texas usually begins toward the latter part of September and lasts until the early part of the following spring. Because of the relative non-perishability of cured sweet potatoes, the time of shipping is more susceptible of control than highly perishable

products such as tomatoes and watermelons.

Figure 11 would seem to indicate that Texas potatoes meet severe competition at the time of heavy selling. However, a large portion of the Texas crop is marketed in the state and, although affected by price-determining influences exerted by other areas, does not come, to any appreciable extent, in direct competition for markets with the production of other states.

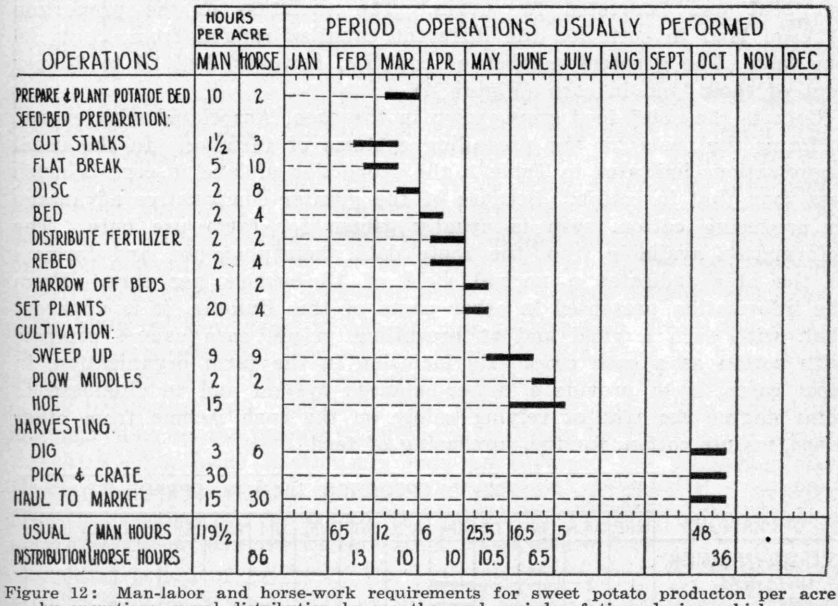

Figure 12: Man-labor and horse-work requirements for sweet potato producton per acre by operations, usual distribution by months, and periods of time during which operations are usually performed.

While there is a wide range in the acreage of commercial sweet potatoes grown per farm, the bulk of the farms from which data were obtained had approximately five acres in the crop. As with the other cash-crop enterprises grown in the area to supplement the income from cotton, the acreage in sweet potatoes has to be adjusted to the usual cropping program of cotton and feed crops from the standpoint of the amount of competition for the labor available. The usual operations and the monthly distribution of man labor and horse work required to produce one acre of sweet potatoes are shown in Figure 12. Sweet potatoes rank next to tomatoes in man-labor and horse-work requirements per acre and compete for labor with both cotton and corn during cultivation and, to a certain extent, during harvest (Figure 15). A considerable amount of cotton is still being picked in October, when the peak of labor on sweet potatoes occurs. The harvesting of corn usually occurs during October also. Unless it is planned to hire outside labor during that period and also during the periods that the crops compete for labor during cultivation, the operator should consider his available

farm labor supply in proportioning his crop land to the different crops that he may plan to include in his farming program.

Corn

Corn is second only to cotton in the proportion of the total crop land occupied. According to the 1930 Census, a little over 20 per cent of the total crop land of the area was in corn. Of this acreage, approximately 98 per cent was harvested for grain. The variation in the proportion of crop land in corn for the different counties ranged from 17 to 26 per cent. The greatest number of counties, however, had 20 to 25 per cent of their land in corn (Figure 4).

Corn is the chief feed crop grown in the area. Associated with cotton, it forms the basis for the prevailing systems of farming. In the usual organizations indicated in Table 1, the proportion of land in corn is much less than that in cotton. Because of the greater comparative advantage in producing cotton, corn is usually grown for farm use only. The information available from the route data, county agents, and farmers in the area indicates a normal yield of 18 bushels per acre. From the information presented in other parts of this Bulletin, it is apparent that, with such a yield and at prevailing prices, corn cannot compete with cotton as a cash crop. Its inclusion in the farm organization, in most cases, is to provide a better-balanced system and to eliminate to some degree the risk of relying solely on the cash income from other crops, mainly cotton, for the purchasing of feed.

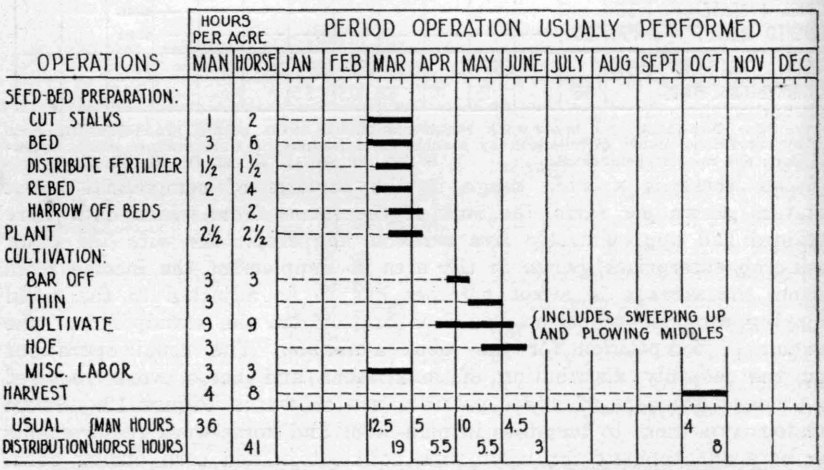

Figure 13: Man-labor and horse-work requirements for corn production per acre by operations, usual distribution by months, and periods of time during which operations are usually performed.

The association of corn with cotton in the farm organization helps to provide a more balanced system in that the corn crop serves to make better utilization of the investment required to produce cotton. The corn crop utilizes the same equipment and workstock used in the

production of cotton and at a time when these often would be idle. While Figure 15 indicates that there may be considerable competition for labor between corn and cotton, the practices on individual farms are usually arranged so that the labor on corn is applied at a time when the cotton crop does not need attention. The preparation of the land and the planting of corn are done usually during March (Figure 13). During April and the first part of May, the cotton land is prepared and planted. During the cultivation of the two crops, although within narrower time limits, this same alternation is effected and, normally, with little or no detriment to either crop. Abnormal weather conditions, however, may interfere with this normal distribution of work on the two enterprises. Continued rainfall, for example, may delay the field work. On the resumption of work, cotton will receive the first attention. This, of course, often results in corn yields being lower than they would have been otherwise. Normally, the harvesting of corn competes for labor with cotton-picking. The period during which corn harvesting may be done, however, is rather elastic and is usually delayed until after cotton harvesting is completed or during a lapse between pickings.

On many of the farms in the area, a considerable proportion of the feed fed is purchased. This may or may not be a good business policy, depending on the relationship between cotton and feed prices. When cotton prices are high relative to feed prices, stressing cotton production and depending on the income to purchase feed may be justified. However, this kind of a price relationship may be reversed the following year. Unless the operator has changed his program to meet this changed price relationship, he may be faced with the necessity of purchasing high-priced feed with the income from low-priced cotton.

Another group of farms in the area usually follows the practice of producing all or a large part of the feed needed on the farm. This is especially true of the farms where the family is the source of labor used. On these farms, not only is the policy considered safer with respect to cotton and feed-price relationships, but the farm system is also better balanced with respect to a better utilization of the labor, workstock, and equipment available.

Hay Crops

The considerations affecting the advisability of producing rather than purchasing farm hay are much the same as those discussed in connection with the corn enterprise. In this case there is the added factor of soil fertility in providing a balanced system of farming in so far as this may be affected by the production of legumes, the rotation of crops, and the feeding of livestock.

Legumes interplanted in corn or grown alone, oats, sorghums, and wild-grass hays are the principal roughages grown in the area. The relative importance of hay and forage crops as compared to crops such as cotton and corn, may be judged from the information presented in Figure 4. The usual operations and the monthly distribution of the labor

requirements involved in the production of these crops are shown in Figure 14. It is a rather common practice in the area to interplant cowpeas in corn. Because of the relatively large amount of hand labor involved in harvesting interplanted cowpeas for hay, however, the bulk of the cowpeas used for hay are grown alone.

OPERATIONS	HOURS PER ACRE MAN	HORSE	PERIOD OPERATIONS USUALLY PEFORMED JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC
COWPEAS														
BED	2½	5												
PLANT	3	3												
CULTIVATE	2	3												
CUT	2	4												
RAKE	1	1												
HAUL	5	8												
USUAL DISTRIBUTION MAN HOURS	15½				1	1½	3	2		8				
USUAL DISTRIBUTION HORSE HOURS		24			2	3	3	3		13				
OATS														
FLATBREAK	4	8												
BROADCAST	½													
DISK	1½	3												
CUT	2	4												
RAKE	1	2												
HAUL	3	6												
USUAL DISTRIBUTION MAN HOURS	12		2	4			2	4						
USUAL DISTRIBUTION HORSE HOURS		23	4	7			4	8						
SORGHUM														
FLATBREAK	4	8												
BROADCAST	½													
DISK	2	4												
CUT	2	4												
RAKE	1	2												
HAUL	5	10												
USUAL DISTRIBUTION MAN HOURS	14½				4		2.5			8				
USUAL DISTRIBUTION HORSE HOURS		28			8		4			16				
BERMUDA														
CUT	2	4												
RAKE	1	2												
HAUL	3	6												
USUAL DISTRIBUTION MAN HOURS	6								3	3				
USUAL DISTRIBUTION HORSE HOURS		12							6	6				

Figure 14: Man-labor and horse-work requirements per acre by operations, for the production of the four principal hay crops, the usual distribution by months, and the periods of time during which operations are usually performed.

Spring-planted oats are the most common in the area. Neither oats nor sorghums were grown for grain on any of the farms included in this study.

Bottomland meadows are the principal source of grass hays. Bermuda is the principal grass in meadow hay, with lesser proportions of carpet and Johnson grasses and Lespedeza in the mixture.

As shown in Figures 15 and 17, there is no serious competition for labor between most hays and other crop enterprises. The periods of keenest competition are during oats harvest and the cultivation or harvest periods of other crops, and between the harvesting of other hays and of peas. Some competition for labor between hays and other crops also occurs during the planting and cultivation of cowpeas, but the amount of labor thus used on cowpeas is relatively light.

Dairying

Due largely to the lack of good pastures and to the small amounts of feed crops produced, dairying occupies a small place in the agriculture of the area. Milk cows are kept primarily to provide dairy products for the farm family. The production of dairy products for sale is, for the most part, incidental to the regular farming program. According to the 1930 Census reports on agriculture, an average of slightly more than two cows were milked per farm on the farms reporting (64 per cent of all farms) cows milked. Of the same group of farms, not more than one in three reported the sale of dairy products. In 1929 the total value of dairy products reported sold from the farms of the area was only 5.4 per cent of the total value of the cotton crop.

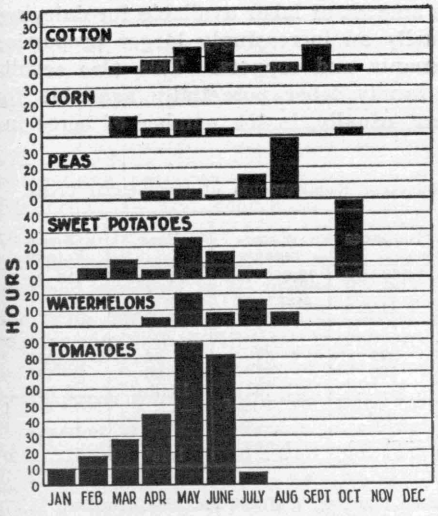

Figure 15: Monthly distribution of man-labor requirements per acre for six principal crops.

In the past, local retail markets for milk and farm butter and the shipping of sour cream have been the chief outlets for surplus dairy products in the area. A recent development has been the location in the area of three milk-processing plants. These plants provide an opportunity to a large number of farmers to market their dairy products or whole milk on a butterfat-content basis. The milk is collected at the farm and hauled by trucks over organized routes to the plants where sweet-cream butter, sweet cream, milk powder, and cottage cheese are manufactured. The producer is paid on the butterfat-content basis, the cost of transporting the milk to the plant being deducted at time of settlement. Since the data were gathered for this study, increases in population, due to oil developments in the central part of the area, have resulted in a greatly increased local demand for dairy products, particularly whole milk.

A study of dairy enterprise records from 45 farms producing milk for sale to milk plants, shows that farms having more than the average

number of milk cows usually have smaller acreages of cotton and somewhat larger acreages of pasture and feed crops. The bulk of these farms had a modal or most common size of 150 acres, with livestock proportions as indicated in Table 4. As the size of farms increased, there was also a decided increase in the number of milk cows kept per farm. This is primarily due to an increase in the acreage of land pastured, as there is a strong relationship between the total acres in pasture and the number of milk cows kept. The amount of labor available for dairying is another factor closely associated with the number of acres in pasture and the number of cattle kept. On the small family farms, an increase in pasture area is reflected in a decrease in crop land, resulting in an increase in the amount of labor available for dairying. As the size of farm increases, usually an increasingly larger proportion of the cop land is operated by tenants and coppers. This also results in an increase in the amount of family labor potentially available for dairying, associated with an increase, usually, in the number of acres in pasture.

Table 4. Normal Yields and Usual Production Requirements of Commercial Crops.

	Cotton	Tomatoes	Water-melons	Peas	Sweet Potatoes
Yields	135 lbs. lint	7,500 lbs.	12,000 lbs.	10 bu.	115 bu.
	173 lbs. seed				
	324 lbs. seed cotton				
Production Requirements:					
Man Labor (hrs.)	76	276	58	66	137
Horse Work (hrs.)	40	135	82	26	72
Seed	1 bu.	¼ lb.	1 lb.	12 lbs.	5 bu.
Fertilizer (lbs.)	200, 4-8-4	700,[2] 4-12-4	100, 4-12-4		350,[4] 4-12-4
Frames Material		3.25[3]			
Crates (number)					115
Other cash costs ($)	1.54[1]			1.25[5]	

[1]Includes ginning, bagging, and ties.
[2]100 lbs. in cold frame, 400 lbs. in field before planting, and 200 lbs. side dressing.
[3]Frames material for hot-bed and cold-frame prorated on acre basis and estimated period of use.
[4]100 lbs. in bed and 250 lbs. in field before planting.
[5]Threshing.

Dairying requires attention during the entire year and therefore competes for labor to a certain extent with all the other enterprises on the farm (Figure 19). The seasonal labor requirements for dairying are fairly uniform. The labor for feeding and sheltering stock during the winter would seem heavier, but this is usually counterbalanced during the summer by the labor required in driving the cows to and from the pasture and in cooling the milk. The chief competition for labor between dairying and other enterprises occurs during the peaks of labor requirements of these other enterprises. Where little or no outside labor is hired, particular attention should be given to the adjustment of the labor available to the labor requirements of the enterprises competing for labor.

On most farms, the buildings, land in pasture, and general overhead do not differ materially from what is usually found on similar-sized farms where cows are kept primarily to supply milk and meat to the

home. Under these conditions the total cost of operating the whole farm is increased but little beyond the additional cash costs incurred in the operation of the dairy enterprise. On some farms, however, dairying has been, or will be, expanded to a point where new buildings and equipment must be added and the cotton acreage materially reduced in order to provide additional feed crops and pasture to meet the needs of the larger enterprise. Thus the entire farm organization is changed to make a place for the dairy enterprise.

The heaviest item of cash expense for producing milk was for feed. Of the total feed fed, 97 per cent of the concentrates and 56 per cent of the roughage were purchased. While most of the concentrates have to be purchased, this does not apply so rigidly to the roughage. With feed prices relatively high compared to the price of butterfat, the wisdom of purchasing most of the feed, especially roughage, is rather questionable. Suitable pastures are one means of providing economical feed and reducing expenses. The farms having the most acres in pasture per head of cattle also purchased the least feed per head. Farms having bottomland pastures of relatively high carrying capacity have a decided advantage in the economical production of dairy products. However, relatively few farms have such pastures and attention should be given to the improvement of the more common upland or rolling pastures. A common practice is to utilize as pasture the rough land which is unfit for crop production or land turned out of cultivation because of depletion of soil fertility. Moreover, very few of these pastures are terraced. While normally of low carrying capacity, such pastures furnish scant grazing during the summer months.

Another important factor affecting profits is the production per cow. While the modal production per cow was 175 pounds of butterfat the average yearly production of milk cows kept on all farms surveyed was 156 pounds during a milking period of approximately nine months. This average production figure includes a range of low and of relatively high producers. The lowest average production per cow per farm was 67 pounds and the highest 300 pounds. The significant point to note here is that as the production per cow increases, there is a strong tendency for the net income per cow, and especially the cash receipts over cash expenses, to increase. This range in production, and therefore in returns from the enterprise, is primarily due to the differences in quality of animals kept and differences in feeding on different farms.

On many of the farms visited the farm-operators had had considerable experience in producing dairy products for local sale or for shipping on a small scale. Selling to milk plants, then, meant only a change in the method of disposal of the products. There is a tendency for profits in dairying to be associated with the experience of the operator, measured by the length of time that dairy products have been produced for sale off the farm. This indicates the necessity of intellignet planning, based on the experience of the more successful operators in the area and, to a certain extent, the advisability of "growing rather than going

into the business". The mistake has been made in many cases of purchasing high-priced dairy stock and going into business without sufficient consideration of the factors that may affect the profitableness of the enterprise on individual farms.

Summary of Distribution of Labor Requirements

Frequent reference has been made to Figures 15 and 17 in illustrating graphically the usual monthly distribution of the labor requirements discussed in connection with the individual crop enterprises. The distribution of the horse-work requirements of these enterprises is shown in Figures 16 and 18. Information pertaining to the monthly labor requirements of different classes of livestock is shown in Figure 19. Illustrated thus, the various enterprises may easily be studied with regard to their relative demands for labor at different times of the year.

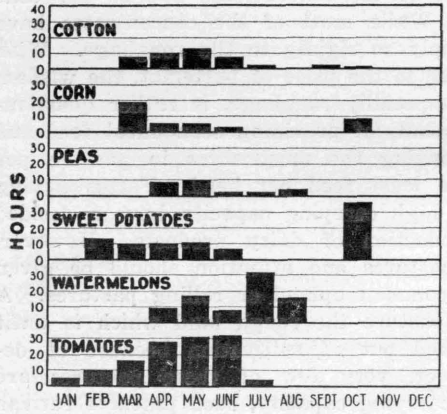

Figure 16: Monthly distribution of horse-work requirements per acre for six principal crops.

The heaviest demands for labor by crops occur during May and June. The cotton crop, occupying a large proportion of the crop area, is practically made during those two months. Where the operator's labor is fully occupied during this peak season, the inclusion or expansion in the organization of other enterprises which have heavy labor requirements during that period usually may be profitably effected only under one of two conditions, or a combination of both. One condition is that additional labor, either in the form of family help or economically hired labor, be available. The other condition is that the cotton acreage be reduced in part. The factors that may influence the adoption of the second condition have been discussed in preceding parts of this chapter.

The small number of livestock usually kept on farms in the area do not require a very large proportion of the total labor used on the farm. When livestock such as dairy cattle and poultry are kept for commercial production, however, the demands for labor are exacting. These livestock enterprises compete with all other enterprises for the labor available.

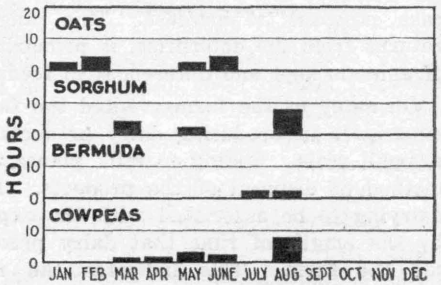

Figure 17: Monthly distribution of man-labor requirements per acre for four principal hay crops.

Normal Yields and Requirements of Crops

The normal yields and production requirements of the leading crops in the Piney Woods farming area of Texas are shown in Tables 4 and 5. The data shown in Table 4 pertain to the most important commercial crops grown. In Table 5 similar data are shown for the leading feed crops. The term "normal yield" refers to the average yield which may be expected over a period of years under the average farming conditions. These normal yields and production requirements, therefore, are susceptible of improvement.

Table 5. Normal Yields and Usual Production Requirements of Feed Crops.

	Corn	Cowpea Hay	Oats	Sorghum Hay	Meadow Hay[1]
Yields	18 bu.	1 ton	1 ton	1½ tons	1 ton
Production Requirements:					
Man Labor (hrs.)	36	15½	12	14	6
Horse Work (hrs.)	41	24	23	28	12
Seed	7 lbs.	17 lbs.	2 bu.	2 bu.	----
Fertilizer (lbs.)	100, 4-8-4	----	----	----	----

[1]Lespedeza, Bermuda, carpet, Johnson, and wild grasses.

The determination of normal yields is based on the results secured on the farms included in this study in 1928 and 1929, supplemented by information secured from county agents, vocational agriculture teachers, agricultural experiment substations, and leading farmers in the area. Production requirements were determined from the practices followed on farms on which detailed records were kept in 1928 and 1929 and from enterprise studies of different commodities.

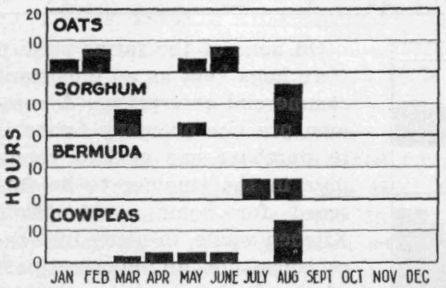

Figure 18: Monthly distribution of horse-work requirements per acre for four principal hay crops.

Normal Production and Requirements of Livestock

The normal production and requirements of livestock are shown in Table 6. This information was obtained from the same sources as given above for crops.

The livestock enterprises on a majority of the farms are relatively unimportant. The livestock other than work stock are kept primarily to supply family needs, with some sales of surplus products.

The work stock kept on the farms included in this study in 1928 and 1929 worked on an average of 720 hours per head per year. It was estimated that the horses regularly used, however, worked on an average of 850 hours per head per year.

During a large proportion of the time when idle and at night during

periods of field work, the work stock are usually kept on pasture. The work stock are generally small in size, ranging in weight from 800 to 900 pounds. These two factors account largely for the relatively small amount of feed fed compared to the practices in some other sections.

Table 6. Normal Production and Usual Requirements of Livestock.

	One Work Animal	One Milk Cow	One Sow	50 Chickens
Contribution to Farm Operation and Income	850 hrs.	175 lbs. B.-fat 140 lbs. veal	10 pigs (1500 lbs. pork)	400 doz. eggs 200 lbs. fryers 50 lbs. hens
Production or Maintenance Requirements:				
Man Labor (hrs.)	60	135	48	86
Horse Work (hrs.)	3	10	3.5	6.5
Feed:				
Concentrates:				
Corn, shelled (lbs.)	2,300		4,500	2,500
Maize heads (lbs.)	500			
Cottonseed (lbs.)		225		
Cottonseed meal (lbs.)		500		
Mixed feed (lbs.)	60	350	50	300
Wheat shorts (lbs.)			500	
Skim milk (lbs)			600	1,250
Roughage:				
Legume hay (lbs.)	1,000	700		
Grass hay (lbs.)	2,000	650		
Cottonseed hulls (lbs.)		650		
Miscellaneous Cash Cost	$1.50	$3.00	$1.50	$1.00
Acres of Pasture	3.5	3.5	2.0	1.25

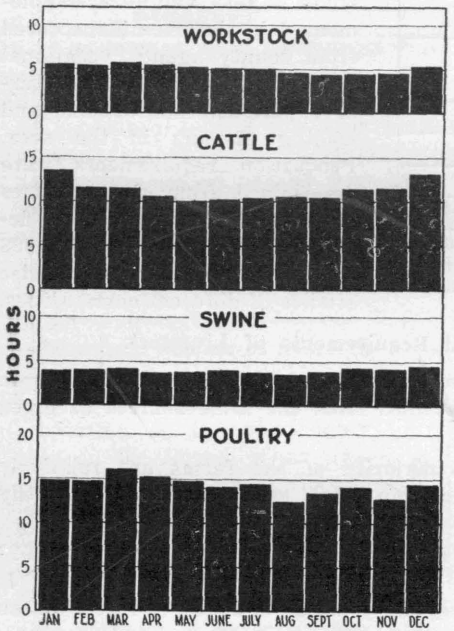

Figure 19: Monthly distribution of man-labor requirements per animal unit of principal classes of live stock.

On none of the farms studied were hogs kept as an important commercial enterprise. A common practice on many farms is to purchase one or two young pigs in the summer to be fattened for home consumption. Kitchen waste, in many instances, constitutes an important part of the feed fed when only one or two hogs are kept. Hogs were raised on a sufficiently large number of the farms studied, however, to furnish a basis for arriving at their usual production and production requirements. This information is shown in Table 4 for an enterprise unit of one sow producing two litters during the year.

Poultry are kept primarily for home consumption of meat and eggs, with a small surplus sold locally. The flocks kept on a majority of the farms

are small. Relatively few farms keep poultry as a major enterprise. The bulk of the farms included in this study kept flocks ranging from 50 to 75 hens. The production and requirements of chickens shown in Table 4 are based on the most usual returns and outlay on these farms.

Building, Machinery, Fence, and Overhead Expenses

The general farm and overhead expenses presented here are derived from data secured on the farms included in this study. As these farms are quite typical of conditions in the area in respect to size and general organization, the average rates set up here should have a wide adaptability on other similar farms in the area. Very small or very large farms, however, may have widely different rates. The overhead expenses per acre will usually be less on a large than on a small farm. The overhead expenses per head of livestock will also be less for farms keeping a relatively large number of animals.

The building expense includes repairs, depreciation, and insurance. The building expense is closely dependent on the number and kinds of livestock kept on the farm. The total building expense chargeable to livestock was prorated to the different classes of stock according to the number in each class and to the space used for storing the feed utilized. The average yearly shelter rates were as follows:

Work stock	$6.00 per head.
Cows	$2.00 per head.
Swine	$0.60 per head of mature stock.
Chickens	$6.00 per 100 head.

The machinery expense includes repairs, depreciation, and a proportion of the building expense determined from the relative space occupied by machinery and equipment. The total machinery expense was prorated to the different crops, on the farms where grown, according to the amount of horse work used on each crop. The average yearly rates determined were as follows:

Cotton	$0.98 per acre.
Corn	$0.74 per acre.
Corn with interplanted legume	$1.07 per acre.
Peas	$0.42 per acre.
Oats	$0.34 per acre.
Sorghum	$0.60 per acre.
Meadow hay	$0.50 per acre.
Cow pea hay	$0.35 per acre.
Tomatoes	$2.45 per acre.
Sweet potatoes	$1.32 per acre.
Watermelons	$0.76 per acre.
Miscellaneous truck crops	$1.87 per acre.

The expense for fences varies not only with the size of farm but also with the amount of cross-fencing that may be necessitated by the livestock kept. For the type of farms included in this study, the

expense for fences averaged 25 cents a year per acre of crop land. This expense includes repairs and depreciation. Repairs, including labor and materials, constituted about 40 per cent of the total fence expense.

On most farms, there is usually some overhead labor which cannot be directly charged to any enterprise and which does not lend itself to proration. Among such expenses are items like ditching, terracing, and other real estate improvements. On the farms studied these expenses constituted an average of 13 per cent of the total labor used on the various enterprises. While such labor constitutes an important item on many farms, it need not necessarily be considered when dealing with the choice of enterprises. The total amount used would not vary appreciably with changes in the relative importance of different enterprises. Moreover, this work is usually done during periods when there is no urgent seasonal work on the various enterprises. In the budget analysis illustrated later, therefore, this general overhead expense will not be considered in judging the relative profitableness of the farm organizations considered.

Prices of Products Sold and Items Purchased

The variations in the supply of and demand for most agricultural commodities and services cause fluctuations in actual and relative prices secured and paid by farmers. In planning the farm organization in terms of future conditions and anticipated prices, a careful appraisal must be made of these conditions of supply and demand as they affect the various items that may enter in the production program. The operator, in the light of these facts, and with information as to the manner in which these forces have affected prices in the past, is able to judge for himself the direction in which prices and price relationships are moving. By using carefully estimated prices that are most likely to prevail at the time that expenses and receipts will occur, the farm-operator takes a forward-looking attitude in farm planting rather than letting the last year's prices serve as the criterion of returns that may be expected the following season.

The prices shown in Table 7 are based on data as to prices that prevailed in the area during the nine-year period of 1921-29. These data were obtained from farmers, local produce dealers, and newspapers in the area, and from published price data for Texas products*. These prices should not be taken as forecasted prices for any particular period but rather as an indication of the long-time price relationships of the items purchased and sold by farmers. Individual operators and extension agencies will use prices, of course, in accordance with the situation that may prevail at any particular time. Current information pertaining to the agricultural situation and outlook may be obtained from State extension agencies and from the United States Department of Agriculture.**

*Current issues of "Crops and Markets," issued monthly by the U. S. Department of Agriculture.

**See, for example, U. S. Department of Agriculture Miscellaneous Publication 137, "The Agricultural Outlook for the Southern States, 1931-32." This publication may be obtained from the Office of Information, U. S. Departemnt of Agriculture, Washington.

Table 7. Prices of Products Sold and Items Purchased.

SALES		PURCHASES	
Items	Price	Items	Price
Cotton, lint (per lb.)	$ .15	Cottonseed meal (per cwt.)	$ 1.75
Cotton seed (per ton)	28.00	Cottonseed hulls (per ton)	10.00
Tomatoes (per lb.)	.03	Bran (per cwt.)	1.75
Sweet Potatoes, cured (per bu.)	1.25	Shorts (per cwt.)	2.00
Sweet potatoes, green (per bu.)	.65	Corn (per bu.)	1.00
Peas (per bu.)	1.75	Maize heads (per ton)	30.00
Watermelons (per cwt.)	.45	Oats (per bu.)	.60
Hens (per lb.)	.16	Tomato seed (per lb.)	5.00
Friers (per lb.)	.25	Pea seed (per bu.)	6.00
Eggs (per doz.)	.25	Watermelon seed (per lb.)	2.00
Hogs (per lb.)	.08	Sorghum seed (per lb.)	.04
Butterfat, sour-cream basis (lb.)	.35	Mixed Feed:	
Butterfat, whole-milk basis (lb.)	.45	Horse (per cwt.)	2.00
Cattle, for beef (per lb.)	.045	Cow (per cwt.)	2.75
Veal calves (per lb.)	.07	Chicken (per cwt.)	3.50
		Hog (per cwt.)	2.00
		Fertilizer (per cwt.)	2.00
		Alfalfa hay (per ton)	30.00
		Prairie hay (per ton)	20.00
		Sorghum hay (per ton)	20.00
		Pick cotton, contract (per cwt.)	.75
		Labor (per day)	1.25

Application of Data in Plannng the Farm Organization for Increased Income

The farm-operator is interested in securing the greatest continuous net profits from his business. In order to do this, he may have to readjust his farm organization from time to time to take advantage of changing economic conditions. The farm-operator has at his disposal the production factors of land, labor, and capital. The organization of these production factors is fashioned with the object of producing one or more of a number of commodities adapted to the area. The selection, proportionate combination, and operation of the enterprises which make up the farm organization will largely determine the returns derived from the business. However, a certain combination may not necessarily be the most profitable on another farm in the same area, nor on the same farm over a long period of time. The farm-operator, then, should plan the organization of his resources not only to take advantage of the natural conditions on his particular farm at a given time, but, as far as economically justified, he should also make timely adjustments which will enable him to take advantage of the changing relationships in the prices of products that farmers buy and sell.

It follows, then, that no blanket recommendation or rule-of-thumb formula can indicate the most profitable combination of enterprises for individual farms at a given time or for a period of time. The acreages of different crops to grow and the kinds and numbers of livestock to keep must ultimately be decided for his particular farm by the farm-operator himself. In formulating his decision, however, the operator should carefully consider the factors that may affect his choice and combination of enterprises. The losses often incurred through fol-

lowing a trial-and-error policy may largely be avoided by intelligent planning. Drawing on his experience and making use of basic information available will enable the operator to plan the organization which gives promise of the greatest net returns over a period of time.

In the preceding section, the adaptability of the leading enterprises has been discussed with reference to the chief factors affecting the extent of their inclusion in the farm organization. Basic information pertaining to normal yields, production, and production requirements has been presented. The next step is to illustrate the use of this information in planning changes for improvement in the organization of farms. A method of planning procedure is outlined in the following pages and the manner in which many of the considerations previously discussed enter into the choice of a combination of enterprises is illustrated. This procedure consists of the preparation of budgets or plans based on estimates which are made for the purpose of testing in advance the comparative profitableness of various alternative combinations of crops or of crops and livestock.

In illustrating the method of budgeting procedure, the more common type of farming followed is the point of departure or base from which changes are made. It is also the standard with which the probable returns from suggested reorganizations are compared. Accordingly, in the first budget the details of the crop and livestock organization, production, production requirements, and expected returns under normal conditions are shown for the cotton-and-corn type of farming practiced by the majority of farmers in the Piney Woods farming area. Other budgets show similar information for farm organizations representing some of the more common variations from this usual type of farming. In all of these budgets it was assumed that in addition to the available time of the operator, family labor equivalent to the full time of one man was also available. Any labor required above the available time of two men was assumed to be extra hired labor. Allowing for rainfall and holidays, it has been estimated that there would be available for field work, under average weather conditions, 20 days in March, 19 in April, 20 in May, 18 in June, 20 in July, 21 in August, 21 in September, and 22 in October. There is practically no field work done in the area from November through February. There is, however, an average of 20 days per month available for field work during that period.

The Cotton System

A complete budget of the more usual or strictly cotton type of family farm, based on the normal figures given in Tables 4, 5, 6, and 7, is shown in Table 8. The greater comparative advantage of cotton relative to many other crops grown is the most important factor accounting for the wide practice of the system. The system also has the advantage of simplicity in both production and marketing. Knowledge of cotton production was a heritage of the people who settled the area, while the marketability of cotton has long given it a marked advantage over the

TABLE 8. DETAILED BUDGET FOR COTTON SYSTEM.

Section A: Acreage and Cash Expenses for Crops.

CROP	Acres	Man Hours	Horse Hours	Seed and Plants		Other Expenses	
				Amount	Cost	Amount	Cost
Cotton	28.00	2,412	1,162	4 bushels	$ 10.00	Fertilizer, 4-8-4, 5,600 lbs.	$112.00
				24 bushels		Ginning, bagging, and ties	43.12
Corn	11.50	415	472	80 pounds		Fertilizer, 4-8-4, 1,150 lbs.	23.00
Cowpeas	1.75	28	42	One-half bushel	1.50		
Garden, etc.	.75						
Bermuda Meadow	3.00	18	36				
Pasture and Woodland	22.00						
Farmstead	3.00						
Totals	70.00	2,603	1,712		$ 11.50		$178.12

Section B: Production and Disposal of Crops.

CROP	Production	Farm Use		Sales	
		Feed	Seed	Amount	Value
Cotton:					
Lint	3,780 pounds			3,780 pounds	$567.00
Seed	4,844 pounds	450 pounds	800 pounds	3,594 pounds	50.32
Seed cotton	9,072 pounds				
Corn	207 bushels	207 bushels	1½ bushels		
Cowpea hay	3,500 pounds	3,500 pounds			
Bermuda Meadow	3 tons	2¾ tons			
Total					$617.32

TABLE 8. DETAILED BUDGET FOR COTTON SYSTEM.—(Continued.)

Section C: Feeds and Other Expenses for Livestock.

Livestock	No.	Man Hours	Horse Hours	Home-Grown Feeds		Purchased Feeds			Other Expenses	
				Kind	Quantity	Kind	Quantity	Cost	Kind	Cost
Workstock	2	120	6.0	Corn	82 bu.	Maize heads	1,000 lbs.	$15.00	Miscellaneous	$ 3.00
				Legume hay	2,000 lbs.					
				Grass hay	4,000 lbs.	Concentrates	120 lbs.	2.40		
Cattle:										
Cows	2*	270	20.0	Cottonseed	450 lbs.					
				Legume hay	1,400 lbs.	Cs. meal	1,000 lbs.	17.50	Miscellaneous	6.00
				Grass hay	1,300 lbs.	Mixed feed	700 lbs.	19.25		
						Cottonseed hulls	1,300 lbs.	6.50		
Swine:										
Sow	1†	48	3.5	Corn	80 bu.	Mixed feed	50 lbs.	1.00	Miscellaneous	1.50
				Skim milk	600 lbs.	Wheat shorts	500 lbs.	10.00		
Poultry	50	87	6.5	Corn	44½ bu.	Mixed feed	300 lbs.	10.50	Miscellaneous	1.00
				Skim milk	1,250 lbs.					
Totals		525	36.0					$82.15		$11.50

†Two five-pig litters produced during year.

*Two calves sold as vealers when 6 to 8 weeks old.

Section D: Production and Disposal of Livestock and Livestock Products.

Livestock	Production	Fed to Livestock	Used in Home		Sales	
			Amount	Value	Amount	Value
Workstock	1,700 hours					
Cows	350 lbs. butterfat	(Skim milk)	270 lbs.	$94.50	80 lbs.	$28.00
	280 lbs. veal				280 lbs.	19.60
Hogs	1,500 lbs. pork		750 lbs.	60.00	750 lbs.	60.00
Poultry	400 doz. eggs	18 doz.*	182 doz.	45.50	200 doz.	50.00
	200 lbs. fryers		100 lbs.	25.00	100 lbs.	25.00
	50 lbs. hens				50 lbs.	8.00
Totals				$225.00		$190.60

*Eggs used in hatching for replacement.

TABLE 8. DETAILED BUDGET FOR COTTON SYSTEM.—(Continued.)

Section E.—Summary of Receipts and Expenses.

Receipts	Total Value	Expenses	Total Value
Crops (Section B)	$617.00	Crops (Section A):	
		Seed	$ 11.50
		Other Expenses	178.12
Livestock and Livestock Products (Section D)	190.60	Livestock (Section C):	
		Feed Purchased	82.15
		Miscellaneous Expenses	11.50
		Hired Labor (424 hours)	53.01
		Other Expenses:	
		Buildings—	
		(2 horses at $6.00)	
		(2 cows at 2.00)	
		(1 1/5 hog units at 3.00)	
		(½ poultry units at 6.00)	22.60
		Machinery—	
		(Cotton, 28 at 98c)	
		(Corn, 11.5 at 74c)	
		(Cowpeas, 1.75 at 35c)	
		(Grass hay, 3 at 50c)	38.06
		Fences	17.50
Totals	$807.60	Totals	$414.44

Net returns before deducting value unpaid family labor	$393.16
Value of unpaid family labor (965 hours)	120.62
Farm income	272.54

Summary.

FARM INCOME	$272.54
Unpaid Family Labor	120.62
Livestock Products Used in Home (Section D)	225.00
Garden (estimated)	60.00
Fuel (16 cords)	48.00
FAMILY FARM INCOME	726.16

more perishable commodities with which it competes for a place in the cropping systems of the area. This was especially true in the early history of the area. While the improvement in transportation and market facilities in recent years has narrowed this advantage, cotton remains the one staple commodity for which the area is well adapted. As has been previously stated, the disadvantages of this system of farming are: (1) Its dependence upon the sale of a single crop for the greater part of the income, with the resulting extreme variations in income due to variation in yields and prices of cotton. (2) There is practically only one pay day in the year. This has usually resulted in the income's being anticipated or spent before it was available and the farmer's depending on credit to finance a large part of his living expenses as well as the production of the next crop. (3) The poor utilization of labor. The labor of the farmer and his family is the most valuable farm resource of the area. Consequently, satisfactory returns to farming depend to a large extent upon the finding of full and profitable employment for this labor.

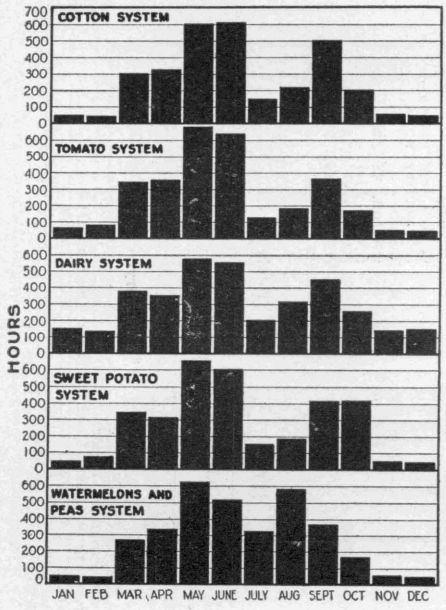

Figure 20: A comparison of the distribution of man-labor requirements of five different systems of farming.

The normal labor distribution of the cotton system is shown in Figure 20. It will be noted that peaks of labor occur in May and June during the cultivation and chopping of cotton and corn, and again in September when the bulk of the harvesting is done. Farm labor is fully employed during those months and reasonably so during March and April, the period during which land is being prepared. During the other seven months of the year the farmer and his family have little to do in the way of productive work.

The Cotton-Tomato System

Some of these disadvantages are partially offset when other cash crops are included in the cropping system. Most efforts of farmers of the area to get away from the one-crop cotton system have been in the direction of substituting a small acreage of some special crop, usually a truck crop, for a part of the acreage devoted to cotton. One of the more common systems resulting from these efforts is illustrated in Table

TABLE 9. DETAILED BUDGET FOR COTTON-TOMATO SYSTEM.

Section A.—Labor Requirements and Cash Expenses for Crops.

CROP	Acres	Man Hours	Horse Hours	Seed and Plants		Other Expenses	
				Amount	Cost	Amount	Cost
Cotton	20	1,530	830	3 bushels	$ 7.50	Fertilizer, 4-8-4, 4,000 lbs.	$ 80.00
				17 bushels		Ginning, bagging, and ties	30.80
Tomatoes	2	553	252	½ pound	2.50	Fertilizer, 4-12-4, 1,400 lbs.	28.00
						Spray material	6.50
Corn	13	467	533	90 pounds		Fertilizer, 4-8-4, 1,300 lbs.	26.00
Cowpeas	3	47	72	1 bushel	3.00		
Garden	1						
Bermuda Meadow	3	18	36				
Pasture and Woodland	25						
Farmstead	3						
Totals	70	2,615	1,723		$ 13.00		$171.30

Section B.—Production and Disposal of Crops.

CROP	Production	Farm Use		Sales	
		Feed	Seed	Amount	Value
Cotton:					
Lint	2,700 pounds			2,700 pounds	$405.00
Seed	3,460 pounds	450 pounds	567 pounds	2,443 pounds	34.20
Seed cotton	6,480 pounds				
Tomatoes	15,000 pounds			15,000 pounds	450.00
Corn	234 bushels	225 bushels	2 bushels		
Cowpea hay	3 tons	2½ tons			
Bermuda hay	3 tons	2¾ tons			
Total					$889.20

TABLE 9. DETAILED BUDGET FOR COTTON-TOMATO SYSTEM—(Continued).

Section C.—Feeds and Other Expenses for Livestock.

Livestock	No.	Man Hours	Horse Hours	Home-Grown Feeds		Purchased Feeds			Other Expenses	
				Kind	Quantity	Kind	Quantity	Cost	Kind	Cost
Workstock	2	120	6.0	Corn	100 bu.	Concentrates	120 lbs.	$ 2.40	Miscellaneous	$ 3.00
				Legume hay	2,000 lbs.					
				Grass hay	4,000 lbs.					
Cattle:										
Cows	2	270	20.0	Cottonseed	450 lbs.	Cs. meal	1,000 lbs.	17.50	Miscellaneous	6.00
				Legume hay	3,000 lbs.	Mixed feed	700 lbs.	19.25		
				Grass hay	1,300 lbs.					
Swine:					80 bu.	Mixed feed	50 lbs.	1.00	Miscellaneous	1.50
Sows	1	48	3.5	Corn	600 lbs.	Wheat shorts	500 lbs.	10.00		
Pigs	10			Skim milk						
					44½ bu.	Mixed feed	300 lbs.	10.50	Miscellaneous	1.00
Poultry	50	87	6.5	Corn						
				Skim milk	1,250 lbs.					
										$11.50
Total		525	36.0					$60.65		

Section D.—Production and Disposal of Livestock and Livestock Products.

Livestock	Production	Fed to Livestock	Used in Home		Sales	
			Amount	Value	Amount	Value
Workstock	1,700 hours					
Cows	350 lbs. butterfat	(Skim milk)	270 lbs.	$94.50	80 lbs.	$28.00
	280 lbs. veal				280 lbs.	19.60
Hogs	1,500 lbs. pork		750. lbs.	60.00	750 lbs.	60.00
Poultry	400 doz. eggs	18 doz.*	182 doz.	45.50	200 doz.	50.00
	200 lbs. fryers		100 lbs.	25.00	100 lbs.	25.00
	50 lbs. hens				50 lbs.	8.00
Totals				$225.00		$190.60

*Eggs used in hatching for replacement.

TABLE 9. DETAILED BUDGET FOR COTTON-TOMATO SYSTEM—(Continued).

Section E: Summary of Receipts and Expenses.

Receipts	Total Value	Expenses			Total Value
Crops (Section B)	$889.20	Crops (Section A):			
		Seed			$ 13.00
		Other Expenses			171.30
Livestock and Livestock Products (Section D)	190.60	Livestock (Section C):			
		Feed purchased			60.65
		Miscellaneous Expense			11.50
		Hired Labor (473 hours)			59.12
		Other Expenses:			
		Buildings—			
		(2 horses	at	$6.00)	
		(2 cows	at	2.00)	
		(1 1/5 hog unit	at	3.00)	
		(½ poultry unit	at	6.00)	22.60
		Machinery—			
		(Cotton, 20	at	$ .98)	
		(Tomatoes, 2	at	2.45)	
		(Corn, 13	at	.74)	
		(Cowpeas, 3	at	.35)	36.67
		(Grass hay, 3	at	.50)	36.67
		Fences			17.50
Totals	$1079.80	Totals			$392.34

Net returns before deducting value unpaid family labor	$687.46
Value of unpaid family labor (944 hours)	118.00
Farm income	569.46

Summary

FARM INCOME	$ 569.46
Unpaid Family Labor	118.00
Livestock Products Used in Home	225.00
Garden (estimated)	75.00
Fuel (16 cords)	48.00
FAMILY FARM INCOME	1,035.46

9, in which the budget method is used to show how the straight cotton system may be adjusted to include the tomato enterprise.

In this system two acres of tomatoes are substituted for eight acres of cotton. Other changes of a minor nature are slight increases in the acreage of feed crops and pasture. The livestock organization is the same.

When normal conditions of yield and prices prevail, an increase in family farm income of approximately $300 is indicated as a result of the change. This difference in returns from the two systems is accounted for largely in the increased cash sale of crops and partly in reduced expenses. In addition to a greater income the principal advantage of this system over the cotton system is that approximately half the income is received during late spring and early summer and the balance in the fall. This should result in a decrease, both in the amount of credit needed and in the length of time it is used, since the returns from the tomato crop may be used to defray some of the expense of producing cotton or to liquidate loans made for the production of cotton.

The question is raised as to the effect of different yield and price relationships on the comparative advantages of these two systems. In this connection it should be noted that a 50 per cent higher yield would be required (an acre yield of 200 pounds of lint cotton) where the cotton system is followed to return an income as large as that shown for the cotton-tomato system.

While it seems that the chances of getting an average price of 3 cents per pound for tomatoes are at least as good as the chances of obtaining 15 cents per pound for cotton, yet, assuming average yields, tomatoes could be sold at 1.5 cents per pound and the tomato system would still make greater returns than the cotton system.

The amount of labor required to operate the two systems is approximately the same although it is distributed somewhat differently throughout the year. It will be noted from Figure 20 that the cotton-tomato system requires more labor during the spring months and less labor during the summer and fall. This is due to the fact that all labor on tomatoes comes in the spring and early summer, with a peak of work during May and June. The spring peak of work on cotton also comes in those two months. This results in somewhat keener competition for labor, at that time, in the cotton-tomato system as compared to the cotton system. Assuming the same amount of family labor available, slightly more hired labor would be needed to operate the cotton-tomato system.

The cotton-tomato system is most advantageous to the family farm located on well-drained "early" land. The tomato marketing season in East Texas is usually terminated about the first of July through competition from areas further North and nearer to market. The length of the marketing season, then, is determined by the ability of growers to get their tomatoes to mature early. The possibilities of so doing are best on well-drained soils which warm up early in the spring and permit early planting and rapid growth. The importance which growers attach

to having an early soil on which to grow tomatoes is indicated by the fact that as much as $25 per acre has been paid as annual rent for small tracts of good tomato land as compared to an average return on rented land in the same area of approximately $2.00 per acre. The importance of early land is further indicated in the tendency to concentrate production in the counties of the area in which such land is prevalent.

Much of the work connected with tomato production, especially the pruning and harvesting, can be done by school children. Most of such work comes during May and June after schools have been dismissed for the year, whereas the bulk of the cotton crop is harvested in September and October, after most schools are in session. The cotton-tomato system, therefore, is somewhat more advantageous for farms on which much of the family labor supply is comprised of children of school ages. Farmers handicapped in the utilization of family labor because of limited land area can reduce this handicap by including in their cropping system crops which make rather intensive use of land such as tomatoes or other such crops which are adapted to their locality.

The Cotton-Dairy System

Another common variation from the usual cotton type of farming is the cotton-dairy system, the details of which are outlined in budget form in Table 10. This system requires a greater total acreage of land, due to the pasture requirements of the dairy enterprise. The crop acreage is approximately the same but a somewhat smaller proportion of it is devoted to cotton. The land thus released is used for hay crops, which are grown to meet the needs of the dairy enterprise for roughages. The estimated returns from this system are approximately $325 more than the returns from the cotton system and slightly greater than the returns from the cotton-tomato system.

Larger capital requirements are also indicated, as well as a broader knowledge of livestock practices. It is a system which should be developed gradually as experience with livestock is gained and as profits justify.

The advantages of this system over the other two systems lie mainly in the distribution of labor requirements and income. The dairy enterprise requires labor rather uniformly throughout the year, thus providin some productive work for members of the family during the seasons of the year when there is practically no work on crops. Although the cotton-dairy system requires nearly 600 hours more labor than does the cotton system or the cotton-tomato system, the peaks of labor are smaller (Figure 20), and the amount of cash outlay for hired labor materially less.

The income from the dairy system is as well distributed as the labor. Only one-third of the receipts are from cotton, and more than half of the cash income is received in the form of weekly or bi-weekly milk or cream checks.

Another advantage would be the gradual improvement in crop yields or lessened expenditures for fertilizers, due to the application of larger amounts of manure and made available through the dairy enterprise. In either event the net result would be a larger net farm income.

TABLE 10. DETAILED BUDGET FOR COTTON-DAIRY SYSTEM.

Section A.—Acreage and Cash Expenses for Crops.

CROP	Acres	Man Hours	Horse Hours	Seed and Plants		Other Expenses	
				Amount	Cost	Amount	Cost
Cotton	20.00	1,530	830	3 bushels	$ 7.50	Fertilizer, 4-8-4, 4,000 lbs.	$ 80.00
				17 bushels			
Corn	11.50	415	472	80 pounds		Fertilizer, 4-8-4, 1,150 lbs.	23.00
Cowpeas	6.00	93	144	102 pounds	5.10		
Sorghum	3.00	44	84	6 bushels	13.50		
Garden	1.00						
Bermuda Meadow	3.00	18	36				
Pasture and Woodland	52.50						
Farmstead	3.00						
Total	100.00	2,100	1,566		$ 26.10		$103.00

Section B.—Production and Disposal of Crops.

CROP	Production	Farm Use		Sales	
		Feed	Seed	Amount	Value
Cotton:					
Lint	2,700 pounds			2,700 pounds	$405.00
Seed	3,460 pounds	2,250 pounds	567 bushels	643 pounds	9.00
Seed cotton	6,480 pounds				
Corn	207 bushels	207 bushels	1½ bushels		
Cowpeas	6 tons hay	6 tons			
Sorghum	4½ tons hay	4½ tons			
Bermuda Meadow	3 tons	3 tons			
Total					$414.00

TABLE 10. DETAILED BUDGET FOR COTTON-DAIRY SYSTEM—(Continued).

Section C.—Feeds and Other Expenses for Livestock.

Livestock	No.	Man Hours	Horse Hours	Home-Grown Feeds		Purchased Feeds			Other Expenses	
				Kind	Quantity	Kind	Quantity	Cost	Kind	Cost
Workstock	2	120	6	Corn	82 bu.	Maize heads	1,000 lbs.	$15.00	Miscellaneous	$ 3.00
				Legume hay	1 ton					
				Grass hay	2 tons	Concentrates	120 lbs.	2.40		
Cattle:										
Cows	10	1350		Cottonseed	2,250 lbs.	Cs. meal	5,000 lbs.	87.50	Miscellaneous	30.00
				Legume hay	5 tons	Concentrates	3,500 lbs.	96.25		
				Sorghum	4½ tons					
				Grass hay	1 ton					
Swine:					80 bu.	Mixed feed	50 lbs.	1.00		
Sows	1			Corn	600 lbs.	Wheat shorts	500 lbs.	10.00	Miscellaneous	1.50
Pigs	10	48	3.5	Skim milk						
					44½ bu.	Mixed feed	300 lbs.	10.50	Miscellaneous	1.00
Poultry	50	87	6.5	Corn						
				Skim milk	1,250 lbs.					
Total		1605	16.					$222.65		$35.50

Section D.—Production and Disposal of Livestock and Livestock Products.

Livestock	Production	Fed to Livestock	Used in Home		Sales	
			Amount	Value	Amount	Value
Workstock	1,700 hours					
Cows	1,750 lbs. butterfat	(Skim milk)	300 lbs.	$105.00	1450 lbs. (whole milk basis)	$652.50
	1,400 lbs. veal	280 lbs.*			1120 pounds	78.40
Hogs	1,500 lbs. pork		750 lbs.	60.00	750 pounds	60.00
Poultry	400 doz. eggs	18 doz.*	182 doz.	45.50	200 dozen	50.00
	200 lbs. fryers		100 lbs.	25.00	100 pounds	25.00
	50 lbs. hens				50 pounds	8.00
Totals				$235.50		$873.90

*Used for replacement.

TABLE 10. DETAILED BUDGET FOR COTTON-DAIRY SYSTEM—(Continued).

Section E.—Summary of Receipts and Expenses.

Receipts	Total Value	Expenses	Total Value
Crops (Section B)	$414.00	Crops (Section A):	
		Seed	$ 26.10
		Other Expenses	103.00
Livestock and Livestock Products (Section D)	873.90	Livestock (Section C):	
		Feed purchased	222.65
		Miscellaneous expenses	35.50
		Hauling charge on milk at 25c per cwt.	72.50
		Hired Labor (239 hours)	29.87
		Other Expenses:	
		Buidings—	
		(2 horses at $6.00)	
		(13 cows at 2.00)	
		(1 1/5 hog units at 3.00)	
		(½ poultry unit at 6.00)	44.60
		Machinery—	
		(Cotton, 20 at .98)	
		(Corn, 11.5 at .74)	
		(Cowpeas, 6 at .35)	
		(Sorghum, 3 at .60)	
		Grass hay, 3 at .50)	33.51
		Fence	25.00
Totals	$1287.90	Totals	$592.73

Net returns before deducting value unpaid family labor	$695.17
Value of family labor (1,045 hours)	130.63
Farm income	564.54

Summary.

FARM INCOME	$ 564.54
Unpaid Family Labor	130.63
Livestock Products Used in Home	235.50
Garden (estimated)	75.00
Fuel (16 cords)	48.00
FAMILY FARM INCOME	1,053.67

Other Systems of Farming

Other common variations previously mentioned are systems including sweet potatoes, and watermelons and peas. A summary of these systems is presented in Table 11 in comparison with the three systems outlined above. The cotton-sweet potato system is of interest chiefly because of the more general adaptability of sweet potatoes than of most other truck crops in the area. The inclusion of the sweet-potato enterprise does not materially improve the seasonal distribution of labor as compared to the cotton system (Figure 20).

Table 11. A Comparison of the Organizations and Estimated Returns on Five Typical Systems of Farming.

	Usual Type Cotton	Cotton with Tomatoes	Cotton with Sweet Potatoes	Cotton with Watermelons and Peas	Cotton with Dairying
FARM AREA	70.00	70.00	70.00	70.00	100.00
Pasture, Woodland, etc.	25.00	28.00	25.00	19.00	55.50
Crop Land:					
Cotton	28.00	20.00	23.00	20.00	20.00
Tomatoes	----	2.00	----	----	----
Sweet Potatoes	----	----	5.00	----	----
Watermelons	----	----	----	4.00	----
Peas	----	----	----	10.00	----
Corn	11.50	13.00	11.50	11.50	11.50
Cowpeas	1.75	3.00	1.75	1.75	6.00
Sorghum	----	----	----	----	3.00
Bermuda meadow	3.00	3.00	3.00	3.00	3.00
Garden	.75	1.00	.75	.75	1.00
Total Crop Acres	45.00	42.00	45.00	51.00	44.50
Hours Man Labor on Crops	2,603	2,615	2,819	2,883	2,100
Hours Horse Work on Crops	1,712	1,723	1,934	1,968	1,566
Number of Livestock:					
Work stock	2	2	2	2	2
Cows	2	2	2	2	10
Sows	1-10 pigs	1-10 pigs	1-10 pigs	1-10 pigs	1-10 pigs
Poultry	50	50	50	50	50
Man Labor on Livestock	525	525	525	525	1,605
Hours Horse Work on Livestock	36	36	36	36	116
Total Receipts	$ 807	$1,079	$1,021	$1,020	$1,288
Total Expenses	414	392	448	408	592
Net Returns before deducting value unpaid Family Labor	393	687	573	612	696
Value of unpaid Family Labor	121	118	116	153	131
Farm Income	272	569	457	459	565
Products Used in Home	333	348	333	333	358
Value Unpaid Family Labor	121	118	116	153	131
Value Family Farm Income	726	1,035	906	945	1,054

An increasing number of farmers are curing their potatoes before selling, thus providing some winter employment and spreading the marketing of potatoes over a period of several months. This, in turn, results in a somewhat larger and better distributed income. If we assume the sale of cured potatoes in the cotton-sweet potato system and allow for a shrinkage of 10 per cent in curing and other incidental costs, the farm income is raised approximately $200 and compares favorably with the income from the cotton-tomato and cotton-dairy systems.

The system including watermelons and peas is most commonly found on the very light sandy soils such as prevail in many communities in

the northwestern part of the area and especially in Henderson County. Peas and melons are grown here because they do relatively better than cotton on this type of soil as compared to the heavier and more fertile soils of other sections of the area. Since cotton yields would be somewhat lower on these light, sandy soils, on an average, than in the area as a whole, the difference in returns obtained from the cotton-watermelon-pea system as compared to the cotton system would be somewhat greater than is indicated in Table 11, in which only average cotton yields for the area are considered.

The outstanding feature of the cotton-watermelon-pea system is the more even distribution of labor requirements as compared to all other cash crop systems included here. While these crops compete with cotton for labor during planting and cultivating time in April, May, and June the harvesting of both comes in July and August when little work is being done on cotton. This fitting of the labor requirements for the harvesting of melons and peas into the slack season between the planting and harvesting of cotton permits the handling of a larger total acreage of crops with practically no change in the equipment or in the size of the labor force. Much of the difference in income between this system and the cotton system is explained by the resulting larger volume of business.

Since the data on which this study is based were gathered, drastic changes have occurred in farm prices, with a greater proportionate decrease in the prices of commodities that farmers sell. The question may reasonably be raised as to the effect of these changes on the comparative advantage or disadvantage of the various systems. To secure at least a partial answer to this question, prices prevailing in the area during 1931 were applied in all budgets. The result indicated that all systems were about equally affected and that there was no significant change in the relative profitableness of the various systems.

In the early part of this Bulletin attention was called to a tendency to concentrate the production of certain commercial enterprises other than cotton in different sections of the area. It was explained that the localization of these enterprises was due primarily to limited market outlets and to the advantages of certain soil types over others in the production of these commodities. In planning readjustments in farm organization, the significance of the above should be carefully noted in so far as these conditions limit the number of farmers who can profitably engage in the production of these commodities.

These budgets and the accompanying discussions serve to indicate the basic information and general considerations involved in a systematic procedure for measuring in advance the probable effect of proposed changes in the organization of farms. The data used are based on averages of groups of farms and as such are useful, mainly, in arriving at general conclusions. In applying this method of planning procedure to an individual farm situation, care should be taken to adjust the basic data to fit conditions pertaining to that particular farm. That is, production

and production requirements obtainable on the farm in question should be used, in so far as possible, rather than the averages of groups of farms. By so doing proper consideration is given to the farm-to-farm differences in natural resources and in farm practices, both of which are normally reflected in differences in yields and in the requirements of production.

All illustrations used are based on the typical family-sized farm. Crop land in excess of that which can be cared for by the operator's family is usually operated by families of share croppers. These cropper units vary in size with the cropper's family, and for the most part are a duplication of the family farm. Although allowance must be made for simplicity in the organization of cropper units in order to facilitate administration, the method of planning outlined on the preceding pages should be equally effective when applied to situations in which share croppers are involved.

SUMMARY

The Piney Woods farming area of Texas comprises approximately twenty-three counties in the northeastern part of the state.

On the large majority of farms cotton is the only commercial enterprise of importance; other enterprises being included primarily to supply, in part at least, farm and family requirements for feed and food. The commercial production of tomatoes, sweet potatoes, watermelons, numerous other crops of lesser importance, and dairy products in certain parts of the area, constitute the principal variations from this usual type of farming.

Because of topographical conditions very few farmers have been able to make use of modern large-scale machinery and present possibilities do not indicate any appreciable shift in that direction. Consequently most efforts to increase farm earnings have been in the direction of increased yields and changing the pattern of the present farm organization to include other and, in most cases, more intensive enterprises. However, some increase in the production per man could be effected in the adoption of one-row machinery in lieu of the more common half-row implements now in use.

A budgetary analysis of the one-cash-crop cotton system of farming and of four other systems which comprise the more common variations from the usual cotton system is based on normal yields, requirements, and price relationships, and serves to illustrate the manner in which many of the considerations involved enter into the choice of a combination of enterprises. Smaller returns to the extent of $200 to $300 are indicated for the cotton system as compared to the other systems. Yields of cotton 50 per cent higher than the normal yields used in the cotton system budget would be necessary to give returns approximately equal to the returns indicated for the other systems. Simplicity in both production and marketing, in addition to the greater comparative advantage of cotton relative to many other crops grown generally in the area, largely accounts for the wide practice of the system. The chief disad-

vantages of the cotton system are: (1) The dependence upon the sale of a single crop for the greater part of the income with resulting extreme variations in income due to variations in yields and prices of cotton. (2) There is practically only one pay-day in the year. This has usually resulted in the income's being anticipated or spent before it was available and the farmer's depending on credit to finance a large part of his living expenses as well as the production of the next crop. (3) The poor utilization of labor. Farm labor is fully employed dering May, June, and September and reasonably so during March and April. During the other seven months of the year the farmer and his family have little productive work.

On soil types favorable to the early maturity of tomatoes, the cotton-tomato system has a marked advantage in income over the cotton system for the typical family farm. It also has the advantage of the income's being divided about equally between spring and fall and consequent lower credit requirements. The labor requirements, however, are no better distributed than in the case of the cotton system.

The advantages of the cotton-dairy system over the cotton and cotton-tomato systems lie chiefly in the distribution of labor requirements and income. The dairy enterprise requires labor rather uniformly throughout the year, thus providing some productive work for members of the family during the seasons of the year when there is practically no work on crops. Although the cotton-dairy system requires nearly 600 hours more labor than does the cotton system or the cotton-tomato system, the peaks of labor are smaller and the amount of cash outlay for hired labor materially less. The income from the cotton-dairy system is as well distributed as the labor. Only one-third of the receipts are from cotton, and more than half of the cash income is received in the form of weekly or bi-weekly milk or cream checks. Another advantage would be the gradual improvements in crop yields or lessened expenditures for fertilizers, due to the application of larger amounts of manure made available through the dairy enterprise. In either event the net result would be a larger net farm income.

The cotton-sweetpotato system is of interest chiefly because of the more general adaptability of sweet potatoes than of most other truck crops in the area. The inclusion of the sweetpotato enterprise does not result in a material improvement in the seasonal distribution of labor as compared to the cotton system. An increasing number of farmers are curing their potatoes before selling, thus providing some winter employment and spreading the marketing of potatoes over a period of several months. This, in turn, results in a somewhat larger and better distributed income.

Watermelons and peas are grown on the very light sandy soils, on which they do relatively better than cotton. The outstanding feature of the cotton-watermelon-pea system is the more even distribution of labor requirements as compared with all other cash-crop systems studied. The fitting of the labor requirements for the harvesting of melons and

peas into the slack season between the planting and harvesting of cotton permits the handling of a larger total acreage of crops with practically no change in the equipment or in the size of the labor force. Much of the difference in income between this system and the cotton system is explained by the resulting larger volume of business.

In applying this method of planning procedure to an individual farm situation, care should be taken to adjust the basic data to fit conditions pertaining to that particular farm. That is, production and production requirements obtainable on the farm in question should be used, in so far as possible, rather than averages of groups of farms. By so doing proper consideration is given to the farm-to-farm differences in natural resources and in farm practices, both of which are normally reflected in differences in yields and in the requirements of production.